SPECIAL CORRESPONDENT AT THE BERLIN PESTALOZZI-FROEBEL HOUSE.
See page 203.

THE PRACTICAL TEACHER

FRAU SCHRADER,
Principal of the Pestalozzi-Froebel House, Berlin.

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OCTOBER NUMBER.

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·VOL· XVII No. 4

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THE

PRACTICAL TEACHER

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'Knowledge is proud that he has learned so much,
Wisdom is humble that he knows no more.'—COWPER.

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FULL NOTES OF A LESSON ON PAWS AND CLAWS, AND THEIR USES.

BY WILLIAM DONE, B.A.,
Head Master of the Brighton Pupil Teacher School.

Described under the heads recommended by Circular 369—'Cat, Dog, Rabbit, Mouse, Mole, Frog,' with which are included Monkey, Camel, Sloth, Fur-Seal.

Articles of Illustration.—The Diagrams accompanying this month's 'PRACTICAL TEACHER,' also live specimens of as many of the animals as can be easily obtained.

HEADS.	MATTER AND METHOD.
1. The hands and feet of a man, the paws of an animal.	We may draw from the children that when we speak of the extremities of the limbs of a man we use the terms hands and feet, but with regard to many animals we speak of their *paws*. Men differ from animals in being able to balance themselves perfectly on their feet, which they exclusively use for locomotion; but their hands are used for grasping and touching. The other animals have not this perfect distinction. We use the term paws for the feet of an animal having claws. We shall see how the paws of animals take different forms according to their modes of life.
2. Monkey. (Diagram A.)	Examine Diagram A. Compare the shape with that of our own hand. The Monkey's fore-paw is very narrow, and the thumb is not nearly so well-developed as in man, but the great toe of the hind foot becomes altered, so as to make a sort of thumb there. From this circumstance Monkeys are often called four-handed animals (Quadrumana).
	Refer to the mode of life of these creatures. Their homes are in the great trees, and they have to climb, jump, and swing from bough to bough. They want therefore great grasping power.
3. Cat. (Diagram B.)	Refer to the stealthy movements of the Cat. The Cat, with all its big relations, such as the lion and tiger, is a toe walker. What looks like the knee is really the wrist. Gently examine the live specimen. The fore-paws have five toes while the hind ones have four. There are also seven soft pads on each front paw and five on the back ones. These pads then account for the silent tread of the Cat. Let a child feel the claws. They are loose, and, as we all know, can be put out or drawn back. A strong ligament passes from the root of the claw to the second bone of the toe, and in a position of rest this ligament keeps the claw drawn back, acting like a piece of elastic. But there is also a powerful tendon passing from the root of the claw over the last joint of the toe. When this is pulled back the claw is drawn sharply down. We may see thus how the sharp points are preserved. Find out from the live animal where the short *thumb* is.
4. Dog. (Diagram C.)	Find out from the children any points of resemblance between the paw of the Cat and that of the Dog. They both walk on their toes, both have pads underneath, and also claws. But the claws on the Dog's feet cannot be drawn back, and therefore we shall probably find them blunt. Elicit that the Dog catches its prey in its mouth, the Cat with its claws. The Dog's claws are more fitted for scratching or digging. Its feet, moreover, are not so broad nor powerful looking as those of the Cat.

Heads.	Matter and Method.
5. Rabbit. (Diagram D.)	Examine the Rabbit. At first the children will probably say there are four toes in each foot. But if they look closely they will find a fifth one, very small, on the inside of each fore foot. On the hind feet there are but four. Hold up the Rabbit's foot. There are no pads, the feet are covered with hair. The claws are well developed, for the animal needs to scratch away the sand and earth in making its burrow. As they feed on vegetables, there is no need for sharp retractile claws for holding prey, nor pads for stealthy walking.
6. Mouse. (Diagram E.)	In the Mouse the claws are prominent. As we know, the Mouse is often seen, like the squirrel, holding its food to its mouth with its fore-paws. It needs good claws also for burrowing. They are bare underneath and not covered with hair as in the rabbit.
7. Mole. (Diagram F.)	A very peculiar feature, indeed, of the Mole is the hand or paw, with which it digs out the earth when making its burrow. The two fore-paws are composed of five fingers, armed with with sharp, strong nails in order to scrape up the earth, and to prevent the accumulated mould from impeding the animal's progress, the hands are turned outwards, so as to throw the waste material out of the way. The hand, therefore, is in the form of a scoop; all the nails come together at the tips. The paws are bare underneath, but slightly covered with hair above.
8. Camel. (Diagram G.)	In the Camel we see the toes have gone down to two. If we examined the foot of the horse we should find it consisted of only one toe. The Camel has a broad, elastic foot. The sole of the foot is a soft pad or cushion. When the animal walks, the weight of its body pressing on this pad makes it spread out and rise round the edges. This enlarges the surface resting on the sandy soil where the Camel chiefly lives, and prevents the feet of the animal from sinking into the loose earth.
9. Sloth. (Diagram H.)	The Sloth, in its natural state, spends its whole life in the trees, not, however, *upon* the branches like the monkey or squirrel, but under them. He moves hanging downward, he rests, and he sleeps hanging downward. To render it fit for this singular mode of life, its long and powerful limbs are furnished with strong curved claws, which hook round the branches. When on the ground these claws are very inconvenient, and so incommode its progress as to make the name of sloth a term of reproach, but among its native branches it moves with great agility.
10. Frog. (Diagram I.)	Place our live specimen of the Frog in a pan of water and let the class see the powerful action of the hind legs in swimming. Hence the webbed toes. Ask for other examples. Again, in jumping, see how the Frog uses its hind legs. Hence these are much more developed than the front ones. These latter also are not webbed. There are no nails on the toes. Why are they not required?
11. Fur-Seal. (Diagram K.)	In the Fur-Seal the toes are not separated, but bound up or united by a web of skin. There are five toes on each foot; the nails, however, are very small, or absent altogether. On land the animal seems very awkward, moving its two fore feet together and then its two hind feet.

WELL-KNOWN TEACHERS AT WORK.

LII.—MR. J. G. TINNER,

Head Master, St. Jude's National Schools, Mildmay Park, N.

The causes that tend to make a teacher 'well known' amongst his fellows are many and various, yet assuredly of these the greatest of all is sagacity in counsel. It is for this that Nestor, the counsellor of Telemachus, is of so high a repute amongst the worthies of antiquity. When, therefore, Mr. Tinner was happily described as the Nestor of the Giant Association, no small compliment was implied; yet of those who know Finsbury's President, not one will deny the aptness of the epithet. Quite by accident we had, but a few days ago, a striking experience bearing out this view. A Finsbury master in difficulties with his managers, in reciting the steps that he had taken to assert himself, began, as a matter of course, by remarking that he laid the matter before Tinner, who advised such and such a course, which course was conscientiously followed.

It was therefore to be expected that the 'Practical Teacher' would not long be content without the inclusion of Mr. Tinner in its gallery of men of mark, and as Mr. Tinner has as high an opinion of the 'Practical Teacher' as the 'Practical Teacher,' has of Mr. Tinner, it was not difficult for that latter-day pest, the interviewer, to obtain permission to 'do his worst.'

We found Mr. Tinner in his pretty bijou abode, situate hard by the school, to which, in company with our host, we at once adjourned. St. Jude's is a building of a somewhat bygone type, but immensely superior to the ordinary voluntary school. When first built, some twenty years ago, the school must have compared favourably with any English elementary school then extant.

We learn that Mr. Tinner was never a pupil teacher. He entered Cheltenham Training College in 1870, and left in 1871 a First Class man, with lively recollections of the Rev. R. M. Chamney, of whom even now he speaks in glowing terms.

His first charge was at Kenn, four miles from Exeter, where, however, he remained but fifteen months, coming to St. Jude's in 1873.

It speaks volumes for the *nous* of Mr. Tinner, that in spite of the competition of neighbouring Board Schools—the excellence of which Mr. Tinner would be the very first to admit—the attendance of St. Jude's has been raised from 100 to 200 during these twenty odd years. We saw enough to show us that Mr. Tinner in council is just the same as Mr. Tinner with chalk and duster—the same quiet respect-begetting manner being in each case characteristic of the man in whose hands character must perforce be moulded, and withal that rightly. In a word, Mr. Tinner is a man of subdued yet unmistakable power, to which is undoubtedly due the unvarying success that has justly waited upon his efforts. In the school work there is nothing showy. Physiology is taken as a specific, and Drawing with

BRITISH MUSEUM

colour-work constitutes one of the class subjects. Respecting the teaching of Drawing our host has strong opinions. It should be taught and should also be paid for, the present grant being ludicrously inadequate. Mr. Tinner is one who believes in the retention of Grammar on account of the valuable inductive training that may be got therefrom. We confess to a similar opinion, Grammar being dry and unprofitable only in unskilful hands.

Of Inspectors Mr. Tinner has had considerable experience. H.M.I. Puzzle, whom dead and gone James Runciman lampooned so artistically, found no flaw in the armour of the Head Master of St. Jude's; on the contrary, one of the superior young men of this functionary gave himself away very neatly when questioning Mr. Tinner's children. The occasion was a word-building lesson, when from gener to generous, and from beauty to beauteous, the Inspector, who had such small consideration for the shortcomings of others, in the face of Webster, Walker, Johnson, and all other lights of English orthography proceeded, for the edification of his hearers, from duty to duteous! a piece of ignorance which might have been forgiven in the case of a less autocratic examiner.

MR. J. G. TINNER,
Head Master, St. Jude's National Schools, Mildmay Park, N.

Mr. Tinner is a temperance man, not only in the matter of alcohol, but also in that even more important one of opinion and speech. Hence he deprecates the extremist expressions of Board teachers and of Voluntary teachers when dealing with the delicate question of Board *versus* Voluntary. Of all the thirty odd thousand members of the N.U.T. there is no more loyal member than J. G. Tinner, and it is certain that his example, as also his speech, has done much to prevent the defection which a few months ago seemed so imminent. The N.A.V.T. knows him not, simply and solely because he will be no party to a movement likely to embarrass the N.U.T. On the other hand, he justly claims that strenuous efforts should be made to remove the undeserved disabilities under which Voluntary teachers in many places groan. He himself rejoices in the possession of exemplary Managers, who regularly meet and justly manage, so that Mr. Tinner's lot is cast in pleasant places in comparison with many of his fellow voluntaryists. He is a sturdy opponent of all compulsory extraneous duties, albeit that perhaps no teacher takes so kindly to the multifarious tasks of an extraneous nature, devolving of necessity upon the enthusiastic unionist worker; but, as Mr. Tinner remarked, here the voluntary nature of the work removes all sting of servitude, and this is the only part of extraneous work to which he and his fellows object.

Sipping a cup of coffee in Mr. Tinner's cosy parlour, your interviewer endeavoured to sum up the services to the Union to which our host had to plead guilty. He is now for the second time President of the largest association of teachers in the land. He is Secretary of the Benevolent Committee, and an active member of several sub-committees of the Council.

'It was at the London Conference,' our host informs us, 'that Finsbury showed to the greatest advantage. By a magnificent contribution of close upon £800, the Birmingham Challenge Trophy was secured for our Association. Our own local bazaar, held at the Myddelton Hall, realised nearly six hundred pounds. To show what this means in the way of work, I may state that whilst Treasurer to the Bazaar Committee, I had to write upwards of five hundred letters, and the work of other helpers was correspondingly great.' Knowing that Mr. Tinner has seen the Finsbury Association increase tenfold, viz., from a hundred to a thousand members, we asked him to what he attributed this unique success. 'In the earlier part of our growth,' came the reply, 'we were greatly assisted by Mr. Baker, our paid canvasser, whose efforts I gladly recognise; but the zeal of the officers, and especially of the secretaries, is to be credited with the kindling of that robust unionist spirit without which our growth would be as that of the mushroom.'

In the creation of the North Metropolitan District Union, Mr. Tinner had both part and lot, wherefore our next query had reference to these unions of associations. 'In my opinion,' was the reply of Mr. Tinner, 'such unions are an unmixed blessing, capable of much service to the N.U.T., even to the extent of solving the knotty problem of electoral districts.'

Readers of the scholastic press need no reminder as to the soundness of the President's views on the late Bill of much discussion. What is not known, however, is the time and trouble taken by Mr. Tinner, in conjunction with other Finsbury stalwarts, to either end or mend the Government proposals. We know of several occasions upon which he spent many wearisome hours in the unthankful yet eminently effective work of House of Commons lobbying, and we can avouch that no effort is too great for Mr. Tinner when good to the profession is likely to be the result thereof; and notwithstanding Mr. Tinner's

Heads.	Matter and Method.
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6. Mouse. (Diagram E.)	In the Mouse the claws are prominent. As we know, the Mouse is often seen, like the squirrel, holding its food to its mouth with its fore-paws. It needs good claws also for burrowing. They are bare underneath and not covered with hair as in the rabbit.
7. Mole. (Diagram F.)	A very peculiar feature, indeed, of the Mole is the hand or paw, with which it digs out the earth when making its burrow. The two fore-paws are composed of five fingers, armed with with sharp, strong nails in order to scrape up the earth, and to prevent the accumulated mould from impeding the animal's progress, the hands are turned outwards, so as to throw the waste material out of the way. The hand, therefore, is in the form of a scoop; all the nails come together at the tips. The paws are bare underneath, but slightly covered with hair above.
8. Camel. (Diagram G.)	In the Camel we see the toes have gone down to two. If we examined the foot of the horse we should find it consisted of only one toe. The Camel has a broad, elastic foot. The sole of the foot is a soft pad or cushion. When the animal walks, the weight of its body pressing on this pad makes it spread out and rise round the edges. This enlarges the surface resting on the sandy soil where the Camel chiefly lives, and prevents the feet of the animal from sinking into the loose earth.
9. Sloth. (Diagram H.)	The Sloth, in its natural state, spends its whole life in the trees, not, however, *upon* the branches like the monkey or squirrel, but under them. He moves hanging downward, he rests, and he sleeps hanging downward. To render it fit for this singular mode of life, its long and powerful limbs are furnished with strong curved claws, which hook round the branches. When on the ground these claws are very inconvenient, and so incommode its progress as to make the name of sloth a term of reproach, but among its native branches it moves with great agility.
10. Frog. (Diagram I.)	Place our live specimen of the Frog in a pan of water and let the class see the powerful action of the hind legs in swimming. Hence the webbed toes. Ask for other examples. Again, in jumping, see how the Frog uses its hind legs. Hence these are much more developed than the front ones. These latter also are not webbed. There are no nails on the toes. Why are they not required?
11. Fur-Seal. (Diagram K.)	In the Fur-Seal the toes are not separated, but bound up or united by a web of skin. There are five toes on each foot; the nails, however, are very small, or absent altogether. On land the animal seems very awkward, moving its two fore feet together and then its two hind feet.

WELL-KNOWN TEACHERS AT WORK.

LII.—MR. J. G. TINNER,

Head Master, St. Jude's National Schools, Mildmay Park, N.

The causes that tend to make a teacher 'well known' amongst his fellows are many and various, yet assuredly of these the greatest of all is sagacity in counsel. It is for this that Nestor, the counsellor of Telemachus, is of so high a repute amongst the worthies of antiquity. When, therefore, Mr. Tinner was happily described as the Nestor of the Giant Association, no small compliment was implied; yet of those who know Finsbury's President, not one will deny the aptness of the epithet. Quite by accident we had, but a few days ago, a striking experience bearing out this view. A Finsbury master in difficulties with his managers, in reciting the steps that he had taken to assert himself, began, as a matter of course, by remarking that he laid the matter before Tinner, who advised such and such a course, which course was conscientiously followed.

It was therefore to be expected that the 'Practical Teacher' would not long be content without the inclusion of Mr. Tinner in its gallery of men of mark, and as Mr. Tinner has as high an opinion of the 'Practical Teacher' as the 'Practical Teacher,' has of Mr. Tinner, it was not difficult for that latter-day pest, the interviewer, to obtain permission to 'do his worst.'

We found Mr. Tinner in his pretty bijou abode, situate hard by the school, to which, in company with our host, we at once adjourned. St. Jude's is a building of a somewhat bygone type, but immensely superior to the ordinary voluntary school. When first built, some twenty years ago, the school must have compared favourably with any English elementary school then extant.

We learn that Mr. Tinner was never a pupil teacher. He entered Cheltenham Training College in 1870, and left in 1871 a First Class man, with lively recollections of the Rev. R. M. Chamney, of whom even now he speaks in glowing terms.

His first charge was at Kenn, four miles from Exeter, where, however, he remained but fifteen months, coming to St. Jude's in 1873.

It speaks volumes for the *nous* of Mr. Tinner, that in spite of the competition of neighbouring Board Schools—the excellence of which Mr. Tinner would be the very first to admit—the attendance of St. Jude's has been raised from 100 to 200 during these twenty odd years. We saw enough to show us that Mr. Tinner in council is just the same as Mr. Tinner with chalk and duster—the same quiet respect-begetting manner being in each case characteristic of the man in whose hands character must perforce be moulded, and withal that rightly. In a word, Mr. Tinner is a man of subdued yet unmistakable power, to which is undoubtedly due the unvarying success that has justly waited upon his efforts. In the school work there is nothing showy. Physiology is taken as a specific, and Drawing with

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colour-work constitutes one of the class subjects. Respecting the teaching of Drawing our host has strong opinions. It should be taught and should also be paid for, the present grant being ludicrously inadequate. Mr. Tinner is one who believes in the retention of Grammar on account of the valuable inductive training that may be got therefrom. We confess to a similar opinion, Grammar being dry and unprofitable only in unskilful hands.

Of Inspectors Mr. Tinner has had considerable experience. H.M.I. Puzzle, whom dead and gone James Runciman lampooned so artistically, found no flaw in the armour of the Head Master of St. Jude's; on the contrary, one of the superior young men of this functionary gave himself away very neatly when questioning Mr. Tinner's children. The occasion was a word-building lesson, when from gener to generous, and from beauty to beauteous, the Inspector, who had such small consideration for the shortcomings of others, in the face of Webster, Walker, Johnson, and all other lights of English orthography proceeded, for the edification of his hearers, from duty to duteous! a piece of ignorance which might have been forgiven in the case of a less autocratic examiner.

MR. J. G. TINNER,
Head Master, St. Jude's National Schools, Mildmay Park, N.

Mr. Tinner is a temperance man, not only in the matter of alcohol, but also in that even more important one of opinion and speech. Hence he deprecates the extremist expressions of Board teachers and of Voluntary teachers when dealing with the delicate question of Board *versus* Voluntary. Of all the thirty odd thousand members of the N.U.T. there is no more loyal member than J. G. Tinner, and it is certain that his example, as also his speech, has done much to prevent the defection which a few months ago seemed so imminent. The N.A.V.T. knows him not, simply and solely because he will be no party to a movement likely to embarrass the N.U.T. On the other hand, he justly claims that strenuous efforts should be made to remove the undeserved disabilities under which Voluntary teachers in many places groan. He himself rejoices in the possession of exemplary Managers, who regularly meet and justly manage, so that Mr. Tinner's lot is cast in pleasant places in comparison with many of his fellow voluntaryists. He is a sturdy opponent of all compulsory extraneous duties, albeit that perhaps no teacher takes so kindly to the multifarious tasks of an extraneous nature, devolving of necessity upon the enthusiastic unionist worker; but, as Mr. Tinner remarked, here the voluntary nature of the work removes all sting of servitude, and this is the only part of extraneous work to which he and his fellows object.

Sipping a cup of coffee in Mr. Tinner's cosy parlour, your interviewer endeavoured to sum up the services to the Union to which our host had to plead guilty. He is now for the second time President of the largest association of teachers in the land. He is Secretary of the Benevolent Committee, and an active member of several sub-committees of the Council.

'It was at the London Conference,' our host informs us, 'that Finsbury showed to the greatest advantage. By a magnificent contribution of close upon £800, the Birmingham Challenge Trophy was secured for our Association. Our own local bazaar, held at the Myddelton Hall, realised nearly six hundred pounds. To show what this means in the way of work, I may state that whilst Treasurer to the Bazaar Committee, I had to write upwards of five hundred letters, and the work of other helpers was correspondingly great.' Knowing that Mr. Tinner has seen the Finsbury Association increase tenfold, viz., from a hundred to a thousand members, we asked him to what he attributed this unique success. 'In the earlier part of our growth,' came the reply, 'we were greatly assisted by Mr. Baker, our paid canvasser, whose efforts I gladly recognise; but the zeal of the officers, and especially of the secretaries, is to be credited with the kindling of that robust unionist spirit without which our growth would be as that of the mushroom.'

In the creation of the North Metropolitan District Union, Mr. Tinner had both part and lot, wherefore our next query had reference to these unions of associations. 'In my opinion,' was the reply of Mr. Tinner, 'such unions are an unmixed blessing, capable of much service to the N.U.T., even to the extent of solving the knotty problem of electoral districts.'

Readers of the scholastic press need no reminder as to the soundness of the President's views on the late Bill of much discussion. What is not known, however, is the time and trouble taken by Mr. Tinner, in conjunction with other Finsbury stalwarts, to either end or mend the Government proposals. We know of several occasions upon which he spent many wearisome hours in the unthankful yet eminently effective work of House of Commons lobbying, and we can avouch that no effort is too great for Mr. Tinner when good to the profession is likely to be the result thereof; and notwithstanding Mr. Tinner's

attempts to suppress this fragmentary record of his labours, your interviewer is not to be coerced into deleting this part of his copy, feeling sure that his readers will pardon him even if Mr. Tinner remains obdurate.

At Conference Finsbury's President is a regular visitor, nor is he content to take up the position of a silent non-combatant, as representatives will readily bear witness. Indeed, Mr. Tinner is the *beau idéal* of an active unionist, knowing not only what he wants, but also how effectively to set about getting it, and the N.U.T. is to be felicitated upon the inclusion of such men in its ranks.

Mr. Tinner's conception of a good teacher includes the due performance of civic duties. For many years he has been a member of the Council of the East Islington Conservative Association, and whether or no we agree with his politics, we feel bound to applaud the determination to play the citizen part to the full which is so eminently characteristic of J. G. Tinner.

'I think,' observed our host, in the course of our conversation, 'that the most pressing question now a-days is the Assistant question. Something should be done to increase the pay of these deserving public servants, especially in the provision of a higher maximum salary. In Finsbury the hardship is acutely felt, on account of the very few Head Masterships falling vacant, so that however deserving and successful an assistant may be, his chances of promotion are of the slenderest description.' We agree with Mr. Tinner that the question is a grave one, and, however far off amelioration may be, we join with him in hoping that everything possible may be done to keep this question to the forefront.

Of the achievements of the N.U.T., the greatest is undoubtedly the charities, and Mr. Tinner, a Life President of the Benevolent Fund and a Life Member of the Orphanage Fund, is nothing if not alert as to all concerning the weal of these our proudest boast. We were not, therefore, surprised when Mr. Tinner spoke deprecatingly of the attempts lately made to saddle the funds with the expenses of country members of the Benevolent and Orphanage Committees. 'Remembering,' said he, 'the whole of the business has to do with the administration of charitable contributions, it seems to me that the entire work should be done freely and lovingly, and that not in the slightest degree should office-holders permit themselves to be regarded as guinea-pigs.' As usual we believe that in giving his own individual views Mr. Tinner voices the opinions of the vast majority of his fellow teachers in this question of the administration of the charitable funds.

It was with regret that we rose to take leave of this sturdy unionist, but as we could not have the conscience to further inflict ourselves upon so busy a man, we at length took our leave, inwardly hoping that Mr. Tinner's sphere of usefulness may be even more enlarged, and that his heart may be further warmed by an even greater addition to the membership of the Association which he loves so well, with its thousand members and its manifold agencies for securing fair play and justice to its numerous clients. With a last aspiration of success to Tinner and Finsbury we at length took our leave.

By way of conclusion we cannot do better than reproduce two extracts from an address given by Mr. Tinner to the Finsbury Association in 1889 in illustration of the way in which our worthy stalwart deals with teachers' questions:—

PAYMENT BY RESULTS.

Some are ready to ask this afternoon: Will the system of payment by results exist in 'the good time' you are inclined to believe in? To that question I answer emphatically, No! I believe it is practically dead, and the wonder is how it has survived so long.

I confess I am always bewildered at the strange infatuation of the nation in ever accepting so unfair, so unjust, and so vile a system of education; and to all thoughtful minds it is a profound mystery how this wretched, iniquitous system was ever introduced. Various reasons have been adduced to account for it, but I can only conceive of one; and that is, that in the beginning of the latter half of the present century

A GRAND COUNCIL WAS HELD IN PANDEMONIUM,

to which all the princes and powers of the vast empire of darkness were summoned for the purpose of devising means whereby the ruin and eternal subjugation of our race might be more readily and effectually accomplished. Naturally all eyes were turned to this sea-girt land of ours—the home of Liberty and the centre of civilisation—and the opinion universally prevailed that here should be the base of their operations, and from here should go out those streams of evil which, unimpeded by any obstacle or any sentiment, and impelled by every power and influence at their command, should deluge the world with evil, and sweep away every vestige of good, and everything indicative of the Divine in man. By a remarkable consensus of opinion, the council admitted that old plans and old ideas were failing. Down through all the ages, superstition and priestcraft had been mighty weapons in their hands for the debasing of mankind, but through the spread of knowledge and the development of science, and the general enlightenment of the age, these were no longer potent for evil. Persecution had been tried; their antagonism had been steady and persistent against all missionary enterprise, and against the extension of Messiah's Kingdom, but the 'little stone' seen in prophetic vision was rolling on over the earth, crushing down all their opposition and rendering their efforts more and more futile, and, therefore, some other course must be resorted to—a course more subtle and insidious still. For centuries, too, drunkenness had been one of their mightiest factors in destroying, and embruting, and blasting everything that was fair and noble and great in humanity; but temperance agencies had sprung up, and the people were becoming more sober, and, therefore, it was absolutely necessary to formulate some other scheme, and devise some other plan, by which their dire aims might be accomplished. Plan after plan was proposed, and discussed, and abandoned, until at length

MAMMON ROSE, AND THUS HE SPAKE:

'I propose that we begin with the young, and in their training and education I will find the mightiest engine by which to enslave humanity, and hurl defiance at Heaven's high throne. The mind, illimitable as space, and vast as infinitude, I will weigh, as in a balance, against gold and silver and bronze; and, incredible as it may appear, I will pay the same percentage of money for the same standard of development in the mind of the sharpest child as in that of the dullest; and, more incredible still, I will make the people believe that it is fair, and just, and laudable. What matter if diversity of character is stamped upon everything human? What matter if no two minds are alike?—I will lie unto them that they are. Though children may differ in stature, though senses may differ, though one may be robust and strong and the other weak and delicate, and a prey to physical suffering, yet, by some inexplicable reason, I will make it appear that the same stereotyped, dull, uniform system of education will suit each. I will do more—

I WILL BANISH ALL JOY AND PLEASURE

from the school, and I will so force upon the child the lessons that are unsuited to its capacity, that the love of learning shall cease with school life, and a school and a book shall become to it the most distasteful and hateful things in the universe. I will do more still: I will appeal to sentimentality, and, under the guise of a reformation in methods of teaching and discipline, I will

SAP THE FOUNDATION OF TRUTH, AND LAW, AND ORDER,

so that rowdyism shall be rampant in the streets, crimes undetected, and respect for authority and government shall cease out of the land, and—if unarrested in my career—I will bring the nation to ignominious and irretrievable ruin. I will do more still—I will

ST. JUDE'S BOYS' SCHOOL, MILDMAY PARK.

TIME TABLE.

Days.	MORNING.										AFTERNOON.								
	9—9.10.	9.10—9.40.	9.40—9.50.	—	9.50—10.20.	10.20—10.50.	—	11—11.30.	11.30—12.	—	2—2.10.	2.10—2.20.	2.20—2.50.	2.50—3.20.	—	3.30—4.	4—4.30.	—	—
MONDAY.	Admission and Prayers.	Scripture	Marking and Closing Registers.	1	Writing	Arithmetic	Recreation.	Reading	Drawing	1	Mental Arithmetic.	Marking and Closing Registers.	Arithmetic	Dictation	Recreation.	Physiology	Grammar	Home Work.	Prayers and Dismissal.
		Scripture		2	Writing	Reading		Grammar	Arithmetic	2			Arithmetic	Geography		Dictation	Drawing		
		Scripture		3	Reading	Writing		Geography	Arithmetic	3			Arithmetic	Reading		Dictation	Drawing		
		Scripture		4	Reading	Writing		Geography	Arithmetic	4			Arithmetic	Grammar		Reading	Dictation		
		Scripture		5	Arithmetic	Reading		Writing	Dictation	5			Reading	Writing		Geography	Arithmetic		
TUESDAY.		Scripture		1	Arithmetic	Composition		Reading	Grammar	1			Recitation	Geography		Arithmetic	Phys. Exercises		
		Scripture		2	Arithmetic	Grammar		Reading	Dictation	2			Arithmetic	Reading		Dictation	Phys. Exercises		
		Scripture		3	Arithmetic	Reading		Dictation	Grammar	3			Geography	Writing		Arithmetic	Phys. Exercises		
		Scripture		4	Arithmetic	Reading		Dictation	Singing	4			Drawing	Reading		Dictation	Phys. Exercises		
		Scripture		5	Reading	Writing		Arithmetic	Singing	5			Drawing	Grammar		Reading	Phys. Exercises		
WEDNESDAY.		Scripture		1	Reading	Physiology		Composition	Arithmetic	1			Arithmetic	Geography		Reading	Singing		
		Scripture		2	Arithmetic	Reading		Dictation	Singing	2			Arithmetic	Geography		Recitation	Drawing		
		Scripture		3	Arithmetic	Reading		Dictation	Singing	3			Arithmetic	Suit. Occuptns.		Dictation	Drawing		
		Scripture		4	Reading	Object Lesson		Dictation	Arithmetic	4			Arithmetic	Recitation		Suit. Occuptns.	Dictation		
		Scripture		5	Reading	Writing		Geography	Arithmetic	5			Reading	Writing		Recitation	Arithmetic		
THURSDAY.		Scripture		1	Reading	Grammar		Composition	Arithmetic	1			Drawing	Geography		Arithmetic	Singing		
		Scripture		2	Arithmetic	Geography		Reading	Dictation	2			Writing	Reading		Arithmetic	Singing		
		Scripture		3	Arithmetic	Reading		Dictation	Recitation	3			Geography	Object Lesson		Grammar	Singing		
		Scripture		4	Arithmetic	Reading		Dictation	Geography	4			Drawing	Singing		Reading	Arithmetic		
		Scripture		5	Writing	Reading		Dictation	Arithmetic	5			Drawing	Singing		Reading	Arithmetic		
FRIDAY.		Scripture		1	Reading	Physiology		Dictation	Arithmetic	1			Reading	Writing		Geography	Drawing		
		Scripture		2	Arithmetic	Reading		Dictation	Grammar	2			Arithmetic	Grammar		Writing	Drawing		
		Scripture		3	Arithmetic	Grammar		Reading	Dictation	3			Reading	Writing		Arithmetic	Drawing		
		Scripture		4	Grammar	Geography		Dictation	Arithmetic	4			Drawing	Writing		Reading	Arithmetic		
		Scripture		5	Writing	Reading		Object Lesson	Arithmetic	5			Drawing	Reading		Suit. Occuptns.	Arithmetic		

take innocence from childhood; I will dry up the fountain of sympathy in the heart of woman; and I will so steel the heart of man that his ear shall be deaf to the cry of pity and to the wail of sorrow; and I will so harass the life of the teacher, I will so beset his path with difficulties, that peace of mind, and quietness of conscience, and the door of hope shall be as far from him as we are from the light and joy of the realms above; I will make his life a life of unceasing drudgery—ever and anon intensified by absurd and childish regulations, and by ceaseless examinations and reports, until reason shall desert him, and he shall wander aimlessly through life,

HIS BODY A LIVING SEPULCHRE

containing a dead mind; or until, worn out by toil and anxiety, with health wrecked, and strength wasted, and reputation gone, he shall seek to hide all in a suicide's grave.' Thus ended Mammon, and so well did he please the general ear, that from the throne came the jubilant but authoritative words:—'Go forth on thy mission, and the benediction of the pit go with thee.' Such was probably the origin of the educational system known as 'Payment by Results.'

RELIGIOUS AND MORAL INSTRUCTION.

Lastly, I urge upon teachers the duty of endeavouring to secure, in 'the changes that are sure to come,' religious instruction and moral training, without which I believe all education to be defective. If the teachers of England are helped and encouraged in the moral training of the young, I have no fear for the future. I put my faith for the future of England, not in her armaments, important and necessary as I believe them to be for the stability and welfare of the Empire, nor in the progress of her manufactures, requisite as I deem that to be for the maintenance of our industrial supremacy over the nations of the earth; nor in the development of art, and science, and literature, anxious as I am that these should be developed as fully as possible in the interest of every rank and order and class in society; but in the inculcation of religious truth, and in the moral up-bringing of her children.

VISITS OF INSTRUCTION.

IV.—A WALK IN THE COUNTRY.

IN speaking of Visits of Instruction the Revised Instructions to Inspectors very truly remarks:—'It should be borne in mind that Objects, when they are brought into the class-room, cannot be there studied under their ordinary conditions, and therefore it is important by a proper use of such expeditions to let the children see what part the Object plays in its usual surroundings.' Hence the Government, and those inspectors who have caught the spirit of the framers of the Code, encourage not only visits to industrial establishments, but also recommend walks into the country and parks. Our town schools are very favourably situated as regards industrial establishments, but many town teachers may be inclined to think that the country, or at least that part of it where anything can be learnt, is beyond their reach. The purpose of the present article is to show that most town schools may find within a short distance almost innumerable objects of interest, certainly more than can be noticed in several walks over the same ground. The class of Objects will of course vary with the time of the year, the district where the walk is taken, and the lessons given in school. It would be well to have some definite object in view, some fact the teacher wishes more especially to illustrate, and while not passing over anything of interest, to pay particular attention to anything bearing upon the purpose in view.

The following is an account of only one short walk, not a compilation of several real or imaginary ones. All the specimens named were found within half an hour's walk from a large school in a town of about 300,000 inhabitants.

One of the lessons in the afternoon was composition. Instead of following the ordinary routine the time-table was so departed from as to bring the composition lesson from 3.30 to 4.0. At 3.30 the boys were taken the nearest way to the country. A little unfrequented bye-way was reached in about a quarter of an hour, and up this we turned. It cannot be said that there was a stream by the side of it, though there was a ditch into which the fields adjoining were drained, and there was just sufficient water to make the bottom of it moist. If within a reasonable distance a small stream of fairly pure water could be found so much the better, as many more interesting Objects could be found. In the present case, however, the stream was not wanted, as the purpose of the walk was mostly to study leaves in their natural surroundings; to note the infinite variety of shape, texture, surface, margin, arrangement, etc.; especially to note how the leaves are so arranged as to get the maximum amount of light with the minimum amount of interference with one another, and to learn to distinguish the ordinary trees by their leaves.

We were too near the town to find fine large specimens of our ordinary forest and hedgerow trees, but in nearly every hedgerow there are small bushes from which specimens of leaves can be obtained. Nothing was noted specially by the ditch-side but a bush of *Alder*, from which we pulled a twig with leaves for examination afterwards when we could sit down and examine and compare several specimens. This is a moisture-loving tree, and by the sides of all streams and rivers it is almost sure to be found. It also abounds in moist boggy woods, and every year 'Cloggers' go out for weeks together to cut down the alder and fashion out of its stem the wooden soles of clogs.

Growing in the hedgerow we found an abundance of *Woundwort*, a plant very much resembling the nettle in general appearance, chiefly because of the shape of the leaves, their saw-like teeth, and rough hairy appearance. I pulled a piece of this plant and rubbed it all over my face and hands. The boys thought I had some potent charm against being nettled, for I could not persuade one of them to touch it until I assured them it was not a nettle. The two may be easily distinguished, for the woundwort has purple-lipped flowers, while the flowers of the stinging-nettle are so small and so much the colour of the leaves that if a boy saw one loaded with flowers he would most probably say it had no flowers on. Having found a false nettle it would be a queer hedgerow that would not furnish a specimen of a true stinging-nettle. One was speedily obtained, and handling it very carefully we took it along with us, together with the other specimens, and small twigs of hazel, elm, oak, and sycamore which we pulled as we went along.

We sat down when we came to a footpath across the fields and examined our specimens. I put the twigs of hazel and

FIG. 1.—TWIG OF HAZEL.

elm side by side, and the children could at once see the similarity of arrangement in the leaves. They came off singly, first on one side then on the other a little higher up

the branch. In each case, too, the plane of the leaf is roughly the same as that of the stem bearing it. (A boy afterwards found a twig of hazel with the plane of the leaves nearly perpendicular to the stem, but this was due to being crowded in growth.)

Both of these facts are well shown in Fig. 1. Note how the leaves are displayed to the best advantage for catching the sunlight; how little one leaf hides another; and yet how little space there is unoccupied by the leaves. Indeed, on looking at branches of elm, hazel, sycamore, etc., at a short distance, they look like unbroken masses of green. The elm leaf, though very like the hazel, is narrower, more pointed at the apex, and the two halves are not alike, one half coming further down the leaf stalk than the other. We noted, also, that the leaf almost fitted the slight winding which is very noticeable in the stem of the elm.

We next examined the twigs of alder and sycamore. The arrangement of the leaves differs very much from the two

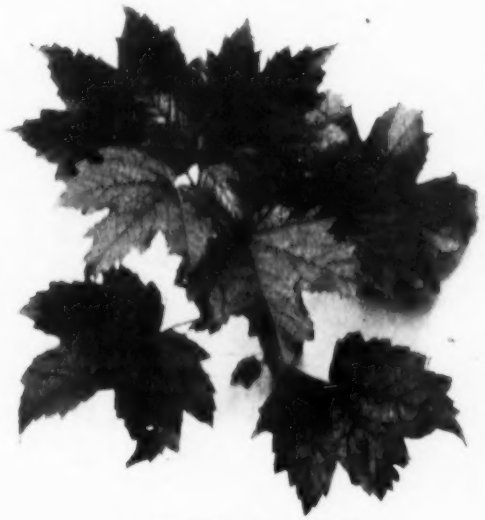

FIG. 2.—TWIG OF SYCAMORE.
Teeth of leaves above over indentations of leaves below.

preceding examples. In these examples the blade of the leaf is, as a rule, perpendicular to the plane of the stem, yet on looking at the accompanying figure it will be seen how excellently the same end is obtained as in the former arrangement. Let several twigs of sycamore be broken off near the top, and look down upon them. In all it will be seen that, roughly speaking, the teeth of the leaf above are over the indentations of the leaf below, the plant seeming to act upon the principle that it is waste of time and material to make tissue that cannot be exposed to sunlight, for, as everyone knows, it is the green matter in a leaf which, under the influence of sunlight, manufactures the chief part of the food of the plant.

It is also noticeable that the bark on all the young twigs is green and smooth. As the tree gets older the bark generally becomes darker in colour and cracked. To illustrate this I asked the boys to conceive what would happen if they were to keep the coat they then had on tightly buttoned around them for some years, till, in fact, they were big, stout young men. They were not slow to tell me it would burst, and that it would burst at its weakest places. This is almost a perfect illustration of the rupture of bark. The young bark fits tightly around the stem. It is elastic enough (and, in fact, grows a little) to stretch without breaking as the wood within grows thicker, but at length the bursting point is reached, and the bark splits along the lines of weakest cohesion. It is interesting to note how these lines differ in different trees. The bark of trees is so distinctive, that persons accustomed to the country can distinguish trees by their bark alone.

Close by where we were sitting were some bramble (blackberry) bushes. This prickly shrub is particularly interesting. Its stem lasts for several years, becomes woody, and is covered with many stout prickles. The stalks and veins of the leaves also have similar prickles *on the under side*, but these are a little less. If we detach a few of the larger ones from the stem, we shall find that they are not in connection with the woody part of the stem, but are only attached to the outer layers of the bark. In this they differ much from the prickles (or rather spines) of the hawthorn which was growing close at hand. I got a boy to make a section with his knife of the spine and stem of the hawthorn, showing its woody interior and also showing the connection of the wood of the spine with that of the stem. As the prickles of the bramble are only connected with the superficial layers of the stem they are really hairs, but they are, of course, very much modified. Now the question arises why should the bramble be defended by such an array of dreadfully sharp weapons. Surely not solely to save its tender foliage, for except the youngest shoots and leaves there is nothing very tender about it, and, besides, why should the prickles be hooked backward? The stem of the bramble is not very strong compared with its length. It cannot grow erect unsupported like ordinary trees and woody shrubs, as may easily be seen in brambles growing away from other bushes. As a rule the bramble grows among other bushes or near an old wall. As it grows upwards the hooked prickles catch hold of stones or branches of other bushes and trees, and once they get hold they do not easily let go. It will now be seen why the prickles on the leaf are only found on the under side. Thus, though the stem cannot support the whole weight of the plant, it is able to climb upwards so that its leaves and flowers may be exposed to the sunlight and not smothered by low-lying foliage.

FIG. 3.—TWIG OF BRAMBLE.

The leaves, too, are interesting. The lower ones are mostly split up into five distinct leaflets, but almost certainly on the same plant the boys will easily find all stages between the compound leaf with its five separate leaflets and the simple leaf.

On the bush we examined we found the following stages:—

1. The compound leaf with five separate leaflets (Fig. 4).

2. *One* of the lower leaflets joined to the one above it, the leaf having four separate parts, but the fifth lobe plainly marked (Fig. 5).

3. The lower leaflet of the other side also joined, there being then three separate leaflets with the lower ones lobed.

4. Three leaflets with no traces of lobes on the lower ones (Fig. 6).

5. The lower leaflets joined to the upper one, the leaf then being all in one piece (simple) with three lobes showing (Fig. 7).

6. A simple leaf at the top with no lobes showing (Fig. 8).

As a rule, these various stages occur from the lowest part of the stem towards the flower. These differences represent

FIG. 4.—LEAF OF BRAMBLE.—FIVE SEPARATE LEAFLETS.

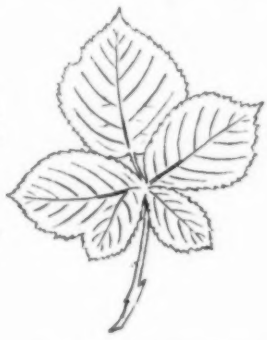

FIG. 5.—LOWER LEAFLET JOINED ON ONE SIDE.—FOUR SEPARATE LEAFLETS.

FIG. 6.—THREE SEPARATE LEAFLETS TO BRAMBLE LEAF.

FIG. 7.—LEAF IN ONE PORTION (SIMPLE).—THREE LOBES SHOWING.

FIG. 8.—SIMPLE LEAF OF BRAMBLE FROM NEAR THE TOP OF THE STEM.

a general tendency in leaves to become more simple as they approach the flower, which is composed of simple modified foliage leaves; but I know of no other plant which contains on the same stem the various stages like the bramble. Once the differences were pointed out to the boys, they sought for examples on every bramble-bush, and during the rest of the walk they continually brought specimens, showing how interested they were and how the faculty of observation had been aroused. The accompanying figure (3) is from the photo of a small twig of bramble. The bottom leaf on the right-hand side is lowest on the stem and consists of five separate leaflets; the one directly above it on the left has only four; the next three leaves have three leaflets each; then comes one with three lobes but all in one piece; and on both the top and side flower-sprays can be seen simple leaves without lobes. It is not always, though, that the various stages can be found in such a small twig as this; generally several branches would have to be searched.

A little further on we found leaves of the ash tree on a small bush in the hedge. I set the boys hunting for an 'even ash' leaf, that is, an ash leaf wanting its terminal leaflet, by telling them a superstition that is very prevalent in country districts. The young men and maidens believe that if they find an even ash, walk home with it tucked in the top of their boot, and then put it under their pillow at night, they will dream of their future husband or wife. The same superstition, I believe, prevails with regard to the clover.

There was one interesting object in our walk which I must not pass over. While some of the boys were seeking more examples of leaves from the bramble, there was a slight movement in the hedge-bottom, and presently out jumped a frog. One of the boys caught it, and we soon had a practical illustration of its amphibious nature, for there was a small pool of water about six yards across in an adjoining field, and into this the little creature was allowed to go. It seemed very glad to escape, though it had not been roughly used, and it wisely remained in the water as long as we stayed.

We had no time to notice the grass of the pastures, which grows the thicker the more it is cropped; the coltsfoot leaves with their downy underside, springing up after the flowers have withered; the buttercups and daisies, sufficient in a lesson by themselves; the downy parachute seeds of the dandelion, groundsel, and thistle; the sharp spinous leaves of the thistle, which protect it from cattle, and cause it to stand out tall and uneaten even in the barest pasture (unless a donkey has been grazing there); the bittersweet, with its climbing stem, peculiar shaped leaves, and clusters of brilliant flowers; the climbing stems of convolvulus, fumitory, and vetch; the running stem of ranunculus repens; the luxuriant growth of grass around the heaps of dung in the pastures; the dust of the road, and how it is formed; the loaded cart, and how the load is disposed so as not to press too much upon the horse or lift it up too much; the curious zigzag flight of butterflies. These and other things I saw, but had to reserve for another walk. The mention of them may, however, be suggestive to teachers who wish to take their scholars out for a short walk, and will certainly show that there is no dearth of interesting things quite close to a large town.

The next composition lesson at school, I let the boys write a description of their walk; and had I not already exceeded the limit of space, I should like to reproduce a few. This, however, is out of the question; but I may say that the boys enjoyed their walk very much, and showed afterwards that it had not been a walk of enjoyment merely, but one of real interest and profit.

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CLASS LESSONS IN DOMESTIC ECONOMY.

BY ETHEL R. LUSH.

Author of 'Chats with Children on Domestic Economy,' Head Mistress of the Ipswich Higher Grade Girls' School, and Organising Mistress to the Ipswich School Board.

STANDARD III.

Lesson IV.—FUR, LEATHER, AND FELT.

Apparatus required.—Specimens of different kinds of fur and leather. Pictures of fur-bearing animals and of a tan-yard.

As winter approaches we take greater interest in fur goods than is found possible during the sultry days of summer, and for that reason you will, I think, enjoy hearing something of the different kinds of fur which we shall shortly see in use.

In our own country fur is almost universally employed as an article of dress, and the extent of its use here will give you some idea of the great demand for it in colder countries. Indeed, in Russia, Poland, Hungary, Bohemia, etc., lambs' skins form an important part of the dress of the lower classes, and the skins of many other animals are largely used. The more beautiful and costly furs, which rank as articles of fashion and luxury, are worn chiefly by the wealthy in England, Turkey, Russia, China, etc.

Turning to the pages of history, we find that so early as the sixth century sables were worn by the fashionable ladies of Rome; but it was not till some hundreds of years later that furs were worn in England. In the reign of Edward III., however, furs became so common that the king forbade their use, except among the richer classes.

Fur is defined as the skins of animals with the hair left on. The hair is provided for the protection of the animal from cold. It is, therefore, only natural to find fur-bearing animals inhabiting cold countries.

Large quantities of furs are brought annually from British North America. When traders first went there in search of fur, the Indians, not knowing the value of the skins, would readily exchange them for beads, nails, hatchets, trinkets, or any trifling article which took their fancy. Now the principal part of the fur-trade of North America is engrossed by the Hudson's Bay Fur Company, which brings cargoes of fur to London every autumn, and holds its sales in March.

Formerly, *beaver* was one of the most valuable furs brought over by the company, but of late years it has lessened considerably in value, owing to the fact that it is no longer used to any great extent in the manufacture of hats.

The skin of the *black and silver fox* is prized in Russia and China; *red fox* is used as linings and trimmings for robes by Chinese, Persians, and Greeks, and the *white and blue fox* is worn by ladies.

Racoon furs are also produced by North America, and are popular in Russia and Germany as linings for coats.

The Hudson's Bay *sable* is of a beautiful brown colour, and is exceedingly valuable. It is largely used in England for trimmings and muffs.

The furs of the *lynx*, *mink*, and *otter* are also produced by lands in the possession of the Hudson's Bay Company. The fur of the sea-otter is short, thick, close, soft, and extremely fine; it is of great value, and is said to be the royal fur of China, where it is worn by officials of State, mandarins, and other important personages.

Valuable as are the furs brought from the cold northern countries of the New World, yet there are many costly furs produced by Northern Europe and Asia, the trade in which is chiefly carried on by Russia.

Of these, *ermine* is one of the most valuable. The animal producing it corresponds to the weasel of our own land. Its peculiar value is due to a provision of nature by which the animal becomes pure white in winter, and is thus not easily distinguishable from the snow over which it glides. For this reason, and because the fur is longer and thicker in winter, the ermine is hunted only during that season. The tail of the little animal is jet-black at the tip, and it is this which is inserted at intervals into the pure white fur. Ermine has for ages past been associated with Royalty. In the time of Edward III. none but the Royal Family was allowed to wear it. It is still worn by Royalty, peers, peeresses, and judges as trimmings to their robes of state. In the case of the Royal Family and the nobility, the number and arrangement of the black spots indicate the rank of the wearer; and with judges, the purity of the unspotted ermine which they wear is supposed to indicate a corresponding purity in their administration of the law.

Russian sables come next to ermine in point of value; the darkest are considered the most beautiful and costly.

Other fur-bearing animals are the *seal*, *bear*, *wolf*, *squirrel*, *Astracan lamb*, *Persian lamb*, *chinchilla*, and *rabbit*. Strange as it may seem to you, the fur of the English silver-grey rabbit is much prized in China.

If you think of the dirty, greasy condition of the skins when removed from the animals, you will understand that furs must be very carefully prepared before they are fit to be worn. In early times, when the wearing of skins was a matter of necessity or convenience, very little trouble was taken in dressing them; but as fur gradually became an article of fashion, its preparation received more care.

The first process belongs to the hunter, who strips off the skins and carefully dries them in the open air. They are next packed and sent to the furrier, who carefully examines them to find out whether they are quite dry. He next proceeds to cleanse them from grease by steeping them in a liquid containing bran, alum, and salt, and then scouring them. After this, soap and soda are applied; and, finally, the skins are washed in clean water and dried. They are are now ready to be cut up and made into various articles of dress, etc.

There is little to say of the properties of fur. It stands first among non-conducting materials of clothing, and is very durable; but it possesses the drawback of being almost impervious to moisture, and consequently does not allow perspiration to escape from the surface of the body.

Having said so much about skins with the hair left on, let us see what is done with those from which the hair is removed.

The skins of animals in their fresh state are tough and flexible, and seem to be well adapted for clothing; but in drying they shrink, harden, become pervious, and if exposed to moisture rapidly putrefy and give off offensive smells. It is, therefore, found necessary to subject them to a preparation similar to the dressing undergone by furs, by which means the skins are converted into leather.

It may interest you to know that our word 'leather' is derived from an old Anglo-Saxon word—'lither,' meaning 'soft' or 'yielding.'

If you look at a piece of leather, and then think of the greasy ox-hides and sheepskins you sometimes see at the butcher's shop, it will be evident this highly-finished leather is the result of many processes, these being collectively known as *tanning*.

Let us imagine that we are visiting a tan-yard. We shall first look at a heap of skins, with the hair still on them just as they left the animal.

Next we visit a number of pits, and note that the whole yard is full of them, with only sufficient space between one pit and another for the tanners to walk upon. In the first set of pits we find raw hides soaking in a mixture of lime and water. The object of this is to loosen the roots of the hair, so that it may be easily removed. The strength of the lime mixture varies in the different pits. The skins are put into the weakest first, and then transferred, pit by pit, to the strongest, until they have soaked in this way for two or three weeks. Every day they are 'handled'—in other words, fished out of the pits with long poles, allowed to drain for an hour or so, and then put back again, the object of this being to equalise the action of the lime.

The next process consists of scraping off the hairs, and on visiting a shed hard by we find men bending over rounded, sloping blocks called beams, upon which hides are spread, and using blunt, two-handled knives of iron, which appear to remove the hair very completely.

The hides are next passed on to the 'fleshers,' who, we observe, use very sharp knives, and are engaged in cutting the flesh and fat from the under-side of the skin.

Having seen enough of this, we return to the yard and approach a set of pits the smell from which is enough to daunt the bravest. Here we find the fleshed hides soaking in 'bate,' a mixture consisting of the dung of hens, pigeons, and other fowls, and in this they remain for a period of eight days, at the end of which time they should be free from the lime previously used.

Now the skins are ready for the tan-pits. These are oblong in shape, about 6 ft. deep, and are filled with a liquor made from oak-bark, and called 'ooze.' The oak-bark is generally ground up small in a mill attached to the yard.

The ooze contains a substance called *tannin*, derived from oak-bark, and it is this which, penetrating into every part of the hide, converts it into leather. It is usual in tanning to vary the strength of the ooze, using the weakest first, and removing the hides to pits containing stronger and stronger solutions, until the process is complete.

The tanned hides—which must now be called leather—are next removed from the pits, and hung up to dry in the cool air.

Finally, the leather is handed over to the currier, who, by a series of processes which we need not enter into now, transforms it into the smooth, highly-finished material with which we are all familiar.

So far we have spoken only of hides and the thick leather made from them. The lighter kinds of leather are made from the skins of the calf, sheep, lamb, goat, kid, deer, antelope, pig, etc.

Light leathers are not tanned with oak-bark, but are soaked in a mixture of alum and salt.

Calf-skin is largely used for the uppers of boots and shoes, and for book-bindings.

Sheep-skin is used for many purposes—such as book-bindings, bags, aprons, the cheaper kinds of wash-leather, etc.

Lamb-skin is made into leather for gloves, as is kid-skin, which is also used for ladies' shoes.

Deer-skin is dressed in oil, and used for riding-breeches. Pig-skin makes a thin, porous leather, especially useful for covering saddles. Goat-skin forms the best kinds of morocco leather.

Then, too, we have leather made from the skins of crocodiles, alligators, lizards, seals, etc., which are principally used for covering purses, and other fancy articles.

The properties of leather have already been touched upon. By taking up a piece and bending it we find that it is flexible, and not brittle; on trying to crack it or tear it, we discover that it is tough; knowing how long a pair of boots will wear, we may say that it is durable; by pouring water into a leather bag we find that it is waterproof, all the pores of the skin having been filled up by tannin. For all these reasons leather is an extremely valuable article of clothing.

Felt, another useful material, differs from woven goods in that the threads merely mat together instead of forming a network.

A pretty story is told of the origin of felt:—'Once upon a time, St. Clement, weary and footsore from a long pilgrimage, sat down by the wayside to rest. To ease his poor, blistered feet he took off his sandals. Before long his attention was aroused by the pitiful bleating of a lamb, which was being chased by a fox. Tired though he was, St. Clement sprang up and frightened the fox away, and the grateful lamb came and lay at the feet of the saint. Looking down upon it, St. Clement noticed some loose wool upon its back, and thought, "Why, this is just the thing to ease my blistered feet!" Accordingly he put a layer of wool in each sandal and went on his way. In the evening he found that the wool had matted into a thick, firm cloth, so strong that he could not pull it apart.' That is the story, and to this day the felters recognise St. Clement as their Patron Saint.

If we examine a hair from a rabbit or a beaver under the microscope, we find that it resembles wool in having a number of teeth or scales projecting from its surface. It is owing to this fact that animal fibres, when rubbed, pressed, or twisted, mat or felt together, the teeth interlacing to form a strong cloth.

Rabbits' fur is most largely used in the manufacture of felt, great quantities being imported annually from Australia and other places for that purpose.

Felt is chiefly used for the manufacture of hats and caps, but is also made into carpets, cloths, etc. It is valuable for its non-conducting powers and its durability.

SUMMARY.

Fur is defined as the skins of animals with the hair left on.

Furs are brought to England in great quantities annually by the *Hudson's Bay Fur Company*. The chief kinds are:—Beaver, black and silver fox, red fox, white and blue fox, racoon, sable, lynx, mink, otter.

European furs include:—Ermine, Russian sable, seal, bear, wolf, squirrel, Astracan lamb, etc.

Properties of fur:—A non-conductor of heat; very durable; impervious to moisture.

Leather is prepared from the skins of animals from which the hair has been removed.

Processes of trimming:—(*a*) Soaking in lime; (*b*) removal of hairs; (*c*) fleshing; (*d*) tanning; (*e*) currying.

Kinds of leather:—(*a*) Thick leather, made from hides; (*b*) calf-skin; (*c*) sheep-skin; (*d*) lamb-skin; (*e*) kid-skin; (*f*) deer-skin; (*g*) pig-skin; (*h*) morocco, made from goat-skin.

Other kinds:—Crocodile, alligator, lizard, seal.

Properties of leather:—Flexible, durable, tough, impervious to moisture.

Felt is made from animal fibres, principally the hair of the rabbit.

FAGIN, THE THIEF-TRAINER.

A NEGLECTED ASPECT OF EDUCATION.

BY JOHN ADAMS, M.A., B.SC.,
Rector, Free Church Training College, Aberdeen.

PART II.

So far we have found no important difference between Fagin's methods and those recommended in the ordinary school-management books meant for less interesting if more legitimate teachers. Indeed, the more carefully we examine Fagin's proceedings the more orthodox do his methods appear. He relies upon the same motives of emulation with which we are familiar.

'"Ah! she's a clever girl, my dears," said the Jew, turning round to his young friends and shaking his head gravely, as if in mute admonition to them to follow the bright example they had just beheld.'

And Pupil-teacher Sikes loyally chimes in, as is fitting:

'"She's a honour to her sex," said Mr. Sikes, filling his glass, and smiting the table with his enormous fist. "Here's her health, and wishing they was all like her."'

Precept is joined to example in the game of picking pockets in which Oliver at first joined, and even when the new pupil's dislike of, and unfitness for, this trick became plain, the wily master was not discouraged. He knew the value of mere mechanical imitation as well as the most experienced among us.

'From this day Oliver was seldom left alone, but was placed in almost constant communication with the two boys, who played the old game with the Jew every day, *whether for their own improvement or Oliver's Mr. Fagin best knew.*'

In short, Mr. Fagin acts precisely as a better trained and more skilful McChoakumchild* might.

* See Dickens: 'Hard Times.'

The only difference is that McChoakumchild teaches virtue, Fagin vice. This being so, what are the intellectual results in the two cases? Apart from the matter studied, whose pupil shows to more advantage, McChoakumchild's or Fagin's?

Oliver Twist and John Dawkins, otherwise known as the Artful Dodger, are expressly stated to be of the same age. Oliver had been brought up on Virtue—that is, in the workhouse. Dawkins had been reared on Vice. Which had the better trained mind? Dickens certainly did not intend his readers to regard Oliver as a fool—Oliver is supposed to be the hero of the story. Why, then, does the reader close the book with the more or less contemptuous belief that Oliver is a noodle, a good little boy who by all the rules of the game ought to have died under Giles' blunderbuss? Dickens means us to think of his hero as a pale-faced, intelligent, indeed *spirituel* boy, and only fails because the Artful Dodger completely outshines his virtuous rival in the favour of the reader. No doubt it is hardly fair to compare a workhouse pupil with the brightest ornament of Fagin's academy. But, take a wider range, and the result is the same. It is matter of the most trite remark that the little street urchin, brought up among vice and squalor, is intellectually much brighter than his better-fed and supposed-to-be-better-taught rival of respectable parentage. Such a wide-spread belief must have some truth in it, and it is obviously of the utmost interest to us, as teachers, to ascertain how much. For if the popular belief implies exactly what appears on the surface, our profession has to face a very grave charge. If the gutter produces better intellectual results than the Board School, then shall the discontented ratepayer have a genuine grievance at last.

To begin with, the method of the gutter has the great advantage of the compulsion of necessity. What can the most zealous compulsory officer do, what can the most supple cane accomplish, in comparison with the persuasive voice of the Mother of Invention? We teach our pupils certain things in order that, 'by-and-by,' they may know how to do certain other things. Fagin and his pupils seek to attain an obvious and immediate end. It may reasonably be interposed here, if Fagin's method of direct teaching produces better results than our indirect methods, why not adopt his method? The reply ought to be threefold. First, an admission that our school methods *are* in some respects too indirect. Sufficient care is not taken to let a child see the 'sense' of what he is learning. We are too fond of telling him to wait till he is big and then he will understand all that. But while we cordially admit so much, it must be remarked, in the second place, that direct teaching is not always desirable, nor indeed always possible. And in the third place, and chiefly, it is at least questionable whether Fagin's methods do produce better results.

In the first place, the comparison between the street arab and the Board School boy is unfair, because of the greater struggle for existence among the arabs. A certain principle known as the *survival of the fittest* has much more scope in the gutter than in a Board School. In Fagin's academy the physically weak go very rapidly to the wall, the intellectually weak to the lock-up. What a waste of gutter children goes to the making of one Artful Dodger! Hunger and cold, whiskey and prison do their work; a few brilliant exceptions are left, and the ordinary Board School boy is compared with a Charley Bates and an Artful Dodger.

But from our present point of view the most important consideration remains. What is made the test of intelligence in the two cases? If you exercise your memory you will admit that almost in every case where the street arab has shown great intelligence it has been a matter of what is called 'the main chance,' looking after Number One. This remark must not be misconstrued. There is no attempt here to deny many good qualities on the part of the street urchin. You have all heard wonderful tales of the kindness of the poor to the poor, and no attempt is here made to call such tales in question. Only, it is worth noting that even in his generosity the arab is concerned with the main chance—his skill is still shown in how he can make ends meet. His intellect is tested by his powers in keeping himself or others alive.

This is generally admitted, but the natural inference is not drawn. Instead of telling in favour of the Board School boy it is usually turned upon him in some such sneer as this: 'Your school-boy is all very well with his vulgar fractions and his parsing—throw him into the street and see how he and his education will compete with the illiterate gamins.' As well might one argue: 'Your monkey is all very well, with his cerebral convolutions and all that, but throw him from the top of the Eiffel Tower, and see how he will compete with the swallow, that you say is intellectually so much his inferior.'

The apperception-masses in the school-boy's mind are quite different from those in the gamin's, and if we make our comparisons always from the gamin's standpoint, naturally the school-boy will always appear at a disadvantage. It is a difference, not of mental power, but of mental *content*.

The same sort of comparison is being made every day between towns-people and country-people. Philology is eloquent with abuse of the countryman, the rustic, the clown, the lout, the boor, the yokel, the clodhopper. Naturally those fancy pictures are drawn by towns-people, who take care that the picture gets in every case a town background. A countryman implores a policeman to pilot him across the Strand: does this prove that the policeman can judge distances and speeds better than the countryman? Change the scene to the country, and the *rôles* are exactly reversed. The policeman makes the wildest guess at distances, and can form no estimate whatever of the speed of birds or rabbits. We can all judge, we can all reason, not so much according to our 'natural powers,' as they are called, as according to our familiarity with the subject under discussion. We are really not entitled to say that So-and-so is a keen observer; what we ought to say is that he is a keen observer of a certain class of things. A man may be a distinguished microscopist, who can observe to the most uncomfortably small fraction of a millimetre, and yet be quite unconscious that his students copy at his examinations; and are we not inclined to deny all claims to philosophic insight to the man who can recognise the friends who pass him in the street?

De Morgan's ideal of education—'to know everything about something, and something about every-

thing'—represents approximately every man's actual state of knowledge. We may not know quite *everything* about something, but we all know practically everything that is worth knowing about something—if it be only the best way of filling a pipe, or twisting a curlpaper; and the farther afield we go from our favourite piece of knowledge, the more uncomfortable we feel, and the slower does the mind act.

For each individual the whole contents of the universe fall into a cosmos special to himself, and in the centre of which he stands. The matters in which he is most interested crowd close up to the centre, and among those his mind acts freely and rapidly. The farther any matter is from the centre the less freely does his mind work in it, till at last, at the outer edge of this cosmos, the mind reaches an endless fringe of what is practically unknown. The range of a man's intellectual activity may be not inaptly compared to one of those ancient charts of the world in which the Mediterranean is marked very boldly, if not too accurately, in the centre, and the rest of the world is represented in ever vaguer and more hesitating outline as it recedes from the known centre, till it loses itself in a vague beyond, pictured by clouds and labelled 'Cimmerian darkness.' An accomplished oculist talks easily, and with a not unpleasant touch of dogmatism, about the eye—the eye is his Mediterranean. Of the ear he talks still easily, if a little contemptuously, but the touch of dogmatism has gone. Of the heart he talks with a familiarity tempered with respect. With ever-waning confidence and waxing respect he speaks of general physiological problems, wide biological questions, Greek, the steam engine, bi-metallism, and a vast *etcetera* of the almost totally unknown.

In short, the soul is not a mere knife which may be sharpened on any whetstone, and, when sharpened, may be applied to any purpose, to cut cheese or to excise a cancer. The knife takes character from the whetstone. The Chancellor of the Exchequer, preparing his budget, has not a better trained mind than the illiterate washerwoman with her hand in the stocking-foot near rent-day—he only deals with higher things. Doubtless the Chancellor would feel as helpless in the art of stocking-foot economy as the old woman would if asked to deal with imperial finance. Think of Laplace, the great Laplace, the man who made the Theory, dismissed by Napoleon for *incapacity*, and say whether the greatest mind may be truly called great when tested apart from the apperception-masses with which it is familiar. Had Laplace's mind been the highly trained instrument formal educationists would have us believe, he ought to have been as good a Minister as mathematician.

One of the leading ideas in Carlyle's book 'On Heroes' is that the great man is intrinsically great; that a great poet might have been equally well a great warrior or a great mathematician. Observe, the statement is 'might have been.' That a great poet may at maturity become a great mathematician the Herbartian would emphatically deny. Had Napoleon caught Laplace young, and given him political work to do, there seems no reason to doubt that the dismissal would not have taken place—the man who is now known as the great mathematician and physicist would have been known as a great minister and diplomate. But if Napoleon had been more patient, and had given the great mathematician more than the few weeks that history records, it is quite probable that Laplace would have made a good average second-rate Minister.

A combination of the Carlylean doctrine of the convertibility of genius and the Herbartian doctrine of mind-building makes the best philosophical blend for the case of the practical teacher. With the whole range of philosophy before him where to choose, the teacher who is anxious to magnify his office will not stir a foot farther afield.

THE INSPECTOR'S NOTE-BOOK.

BY AN INSPECTOR OF SCHOOLS.

The Season of Study approaches. The month of hips and haws and of the falling leaf is come, heralding the approach of hoary winter. Much hard work is accomplished in the schools now that the temperature is lower. Snow and rain begin to tell upon the attendance in the Infant Departments, however. Gloomy winter is the study season. In many an upper chamber, both in college and out, much midnight oil will be consumed by the undergraduates of the great teaching army.

* * * * * *

A few words on Study. Which suggests to me a few thoughts upon study. There is no class which needs counsel on this subject more than teachers. Their whole life practically is spent in study. That I may be practical, I propose to confine my remarks to the aspiring Queen's Scholars of December next. At some later date, it may be, time will be found for some general observations. Study methodically. Do not neglect the body whilst attending to the mind. A systematic student can get through as much in three hours as an unmethodical person can in five. Spend some time weekly in *arranging* the knowledge you have been absorbing during the last nine months, bearing well in mind that it is not a question of what you know so much as how you express your knowledge.

* * * * * *

The importance of answering questions methodically. The importance of this is recognised especially by those who coach for the Civil Service Examinations. Having marked hundreds of papers, I am in a position to judge, too, of its importance.

The success of those who prepare for Teachers' Examinations is to a great extent due to the fact that special stress is laid upon the answering of questions.

In this connection I would strongly recommend pupil teachers unable to attend central classes to join some correspondence college, especially for the last six months, in order that they may be brought into line in this matter of answering questions.

* * * * * *

Neatness and Method. Neatness and method are two essentials to success at the Queen's Scholarship Examination. The examinee should endeavour to so express himself, that the examiner can gauge his answer with the minimum amount of unnecessary trouble. Many teachers do not divide the absolute amount of time at any examination by the number of questions to be answered. As a general rule a teacher should practice himself in answering a question in Geography, History, or School Management in about twelve minutes. Many questions now-a-days are complex. If there are two or three distinct parts, this should be noted, and justice given to each. Often the first part is dealt with copiously, and the second part rushed. Let me give an illustration:—

State briefly what is meant by constant winds and ocean currents. The Gulf Stream is said to influence the climate of these islands. How would you explain this?

In this question there are two distinct parts. A full answer should deal as fully with the explanation of the influence of the Gulf Stream as with the account of the constant winds and ocean currents. As far as the examinee is concerned, each part should be regarded as of equal value.

* * * * * *

Avoid verbosity. Touch the spot. What one frequently finds is, however, that the first part has taken up twice as much time to answer as the second. Answer the questions succinctly. In other words, don't talk round the question, but grasp the point at once. Avoid introductions, anecdotes, and expressions of opinion. Where possible, tabulate your answers.

* * * * * *

Regular Attendance the mark of a successful Evening School. The success, or otherwise, of an Evening School is very largely indicated by the attendance. This is, in fact, the teacher's greatest difficulty. However desirable and successful free education may be in the Day School, it certainly has not proved a success in the Evening School. For my own part, I favour a kind of middle course, though no hard-and-fast line can be drawn. In many rural districts, for instance, it has been found expedient to charge a weekly fee; in other places each scholar pays down the fees in a lump sum.

The most objectionable practice is to let all comers in quite free. The most satisfactory is to charge an admission or registration fee. This should not be a large sum—about sixpence, say. These fees might be returned to all who make 80 per cent. of the total attendances. The admission fee keeps out the ne'er-do-wells, who come for sport and leave at the end of at most a week.

* * * * * *

Don't bribe the Scholars. Do not offer too many bribes to your students. The education they receive is itself cheap enough, without bun teas, socials, and trips to the seaside. Those who come chiefly for 'bread and sport' are better outside than in. At the same time a gentle stimulant in the shape of a book prize for regular attendance and attention to study should under most circumstances be administered. Having said so much, let me return to my opening statement on Evening Schools, viz., the success is largely indicated by the attendance. I do not mean that a large school is always more successful *per se* than a small school. The point is, 'What percentage of the scholars enrolled have attended regularly throughout the session?' The school may be small, but 90 per cent. of the enrolled scholars may have gone through the session. In such a case the attendance would be one mark—and a very important one—of success.

* * * * * *

Take an interest in your Scholars. There may be another school where 1,000 scholars were enrolled, of whom 250 endure to the end. Here some other mark of success than attendance would be required. Generally speaking, if good fare is provided for the scholars they will attend regularly. As soon as the discipline becomes lax and the lessons uninteresting, the scholars begin to leave. It is often found useful to have a football club in connection with the Evening School. This is evident on the face of it, for sport and study should always be combined. In one big school the master arranges matches on Saturdays for his night school team, and sends short accounts to the local papers.

* * * * * *

Call in person on the Absentees. In order to maintain regular attendance, do not omit to either send a note or a postcard to each absentee. When possible, call weekly on the absentees. It is really wonderful what effect personal calls have. They show that the master has a real interest in individuals. Then, again, it brings the master in contact with the parents, who generally straightway act as his attendance officer. Postcards are useful articles, but they do not appeal to a person as a personal call does.

* * * * * *

Adults need special treatment. Be careful how you deal with the adults. They should always receive separate treatment. To herd them with hobble-de-hoys has been proved a failure. In towns they should congregate at separate centres. Where this is impracticable, fit them up with a class-room as far removed from the youths as possible. They positively object to compete in any way with those who have just left school, and who wonders? There is another point worth notice regarding the adults. A special teacher, one who is quite fitted to handle the patriarchs or matrons gently, must be selected. The one who is a success with the boys, won't necessarily manage their fathers.

* * * * * *

The Managers should back up the Teachers more. Evening Schools are too frequently left entirely in the hands of the master, the managers being often mere figure-heads. Indeed so much was this the case last year, that in many instances, the regulation of the Code requiring the registers to be checked monthly by the managers was a dead letter. Some schools were unvisited throughout the session by any member of the Board under whose management they were conducted. Some of the most successful schools I know are those in which a personal interest is taken by the managers. Let me advise rural masters to endeavour to enlist the aid of an influential gentleman or lady of the vicinity to pay an occasional visit.

* * * * * *

Questions invited. When I began writing these stray notes, I invited questions upon school matters from my readers. I must assume that the Code is now so explicit in all its details, that there is no call for explanation by experts. And to be candid, I fancy our friends, the members of the legal profession, would have less work to do if all the Acts of Parliament were as lucid as the Code. It may be, however, that there are yet some to whom I may be of help. If any such there be, a letter addressed 'Inspector,' care of the Editor of this Journal, will find me.

COURSE 'B' IN ARITHMETIC.

A COMPLETE SYLLABUS FOR A YEAR, IN MONTHLY SECTIONS, WITH TESTS.

BY B. ELDERKIN,
Model School, Westminster Training College.

For Introductory Notice and First Month see February number of PRACTICAL TEACHER.

STANDARD I.

Syllabus—8th Month.

(*a*) Add and subtract in two figures.
(*b*) Multiply and divide to 5 times 12.
(*c*) 6 times table.

Test.

1. If I gave away 15 pencils to one class, 28 to another, 17 to another, and then had 25 left, how many had I at first?
2. There are 93 red and blue marbles in a box: if 28 are red how many are blue?
3. Find
   3 times 17
   4 ,, 19
   5 ,, 13
4. Divide 75 by 5.

STANDARD II.

Syllabus—8th Month.

Money sums in four rules up to £8.

Test.

1. Add 47 farthings, 59 pence, 87 shillings, and 6 half-sovereigns.
2. Take £5 13s. 7½d. from £7 10s. 6d.
3. What would 8 pigs cost at 13s. 4d. each?
4. Find the ⅓ of 5s. 6d.
   ,, ¼ of 9s. 4d.
   ,, ⅛ of £2 6s. 6d.

STANDARD III.

Syllabus—8th Month.

1. Simple and Compound Multiplication and Division by 28, 38, 48, etc.
2. Addition and Subtraction to £80.

Test.

1. (*a*) Add 860, 531, 1073, and 3192.
   (*b*) Take 1762 from 8509.
2. Divide 4076 by 78.
3. Multiply £1 13s. 4½d. by 58.
4. Divide £79 6s. by 28.

STANDARD IV.

Syllabus—8th Month.

Four rules in all measures.

Test.

1. Add together 15 yds. 2 ft. 9 ins., 27 yds. 9 ins., 3 ft. 10 ins., 29 yds. 2 ft., and 18 yds. 1 ft. 8 ins.
2. Take 13 dys. 21 hrs. 41 min. 13 sec. from 51 dys. 19 hrs. 50 min. 8 sec.
3. Multiply 17 gals. 3 qts. 1 pt. by 58.
4. Divide 13 tons 14 cwt. 3 qrs. of coal into 7 loads.

STANDARD V.

Syllabus—8th Month.

(*a*) Compound Practice in Capacity and Long Measure.
(*b*) Revise rules.

Test.

1. $2\frac{3}{4} + 5\frac{1}{2} + 6\frac{5}{8}$
   $5\frac{1}{8} - 3\frac{5}{8}$.
2. 13 mls. 5 fur. 44 yds. at £3 10s. per mile.
3. 5 qrs. 6 bush. 3 pks. 1 gal. at 13s. 6d. per bushel.
4. Reduce 3 qrs. 16 lbs. to the fraction of 3 cwt. 2 qrs.

STANDARD VI.

Syllabus—8th Month.

(*a*) Measurement of Cubes and Rectangular Solids. (*Boys.*)
(*b*) Revision of Fractions and Proportion. (*Girls.*)

Test.—(*Boys.*)

1. Find the value of a block of marble 5 ft. long, 2 ft. wide, and 14 ins. thick at 10d. per cub. in.
2. What would be the cost of digging a trench 25 yds. long, 1½ yds. wide, and 2 ft. deep at 3s. 6d. per cub. ft.?
3. Find the contents of a cube which measures 14 ins. on each side.
4. How many scholars could be accommodated in a school 75 ft. long, 25 ft. wide, and 30 ft. high, allowing 80 cub. ft. of space for each scholar?

Test.—(*Girls.*)

1. What fraction added to $\frac{1}{4} + \frac{1}{5} + \frac{1}{8} + \frac{7}{20}$ will make 5·75?
2. Find the value of 19 tons 13 cwt. of hay at £7 10s. per ton.
3. Simplify $(6\frac{1}{2} \times 8\frac{1}{15} \times 16\frac{1}{4}) \div (8\frac{1}{2} + 6\frac{1}{4}\frac{7}{4} - \frac{5}{8})$.
4. If I buy 14 yds. for £5, how many yards could I buy for $28\frac{1}{7}$ shillings?

STANDARD VII.

Syllabus—8th Month.

Exchanges of Stock affecting (*a*) Gain or Loss of Value (*b*) Gain or Loss of Income.

Test.

1. I sell out £2250 stock at $101\frac{1}{4}$ which cost me $97\frac{3}{4}$; what do I gain, allowing $\frac{1}{4}$ per cent. for brokerage on each transaction?
2. How will my income be altered by transferring £500 of 10% Bank Stock at £180 to Railway Shares at £120 and yielding 4 per cent. interest?
3. A person invests £5760 in the 3½ Per Cents. at 90, but when they fall to 85 he sells out; what sum does he realise?
4. I invest £1200 in the 3½ Per Cents. at 84; what rate of interest do I get for my money?

TESTS—EIGHTH MONTH ANSWERS.

Standard I.—(1) 85; (2) 35; (3) 51, 76, 65; (4) 15.
Standard II.—(1) £7 13s. 10½d.; (2) £1 16s. 10½d.; (3) £5 6s. 8d.; (4) 1s. 10d., 2s. 4d., 7s. 9d.
Standard III.—(1) (*a*) 6556, (*b*) 6747; (2) 52 + 20; (3) £96 14s. 6½d.; (4) £2 16s. 7½d. + 24.
Standard IV.—(1) 92 yds. 2 ft.; (2) 37 days 22 hrs. 8 min. 55 sec.; (3) 1036 gals. 3 qts.; (4) 1 ton 19 cwt. 1 qr.
Standard V.—(1) $9\frac{19}{37}$; (2) £47 15s. 6d.; (3) £31 12s. $9\frac{3}{4}$d.; (4) $\frac{55}{88}$.
Standard VI.—(*Boys.*)—(1) £840; (2) £118 2s. 6d.; (3) 1 cub. ft. 1016 cub. ins.; (4) 703.
(*Girls.*)—(1) $4\frac{84}{120}$; (2) £147 7s. 6d.; (3) $57\frac{3}{8}$; (4) 4 yds.
Standard VII.—(1) £81 11s. 3d.; (2) Lose £20; (3) £5440; (4) $4\frac{3}{8}$%.

OUR 1897 CERTIFICATE CLASS.

BY J. C. HOROBIN, M.A.,
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The Examination for Certificates will commence on Monday, 12th July 1897, at 2 p.m.

The general conditions for candidates are to be found in Articles 55–64 and 116–121 of the current Code.

NOTES ON THE QUESTIONS.

Penmanship.

The capital P and the joining of the *h* and *r* are the points to which most attention should be paid.

School Management.

1. The main fault likely to be found would be mixing the object of the lesson. If for infants, details of construction are out of place, whilst for an upper standard doing manual work, technical phraseology might usefully be employed.
2. This is a stock question well answered in all the manuals. The pitfall is in not keeping clearly distinct—READING and *spelling*.
3. Note that articulation is mainly concerned with the consonants, pronunciation with the vowels.

Composition.

Note the adjectives *honest* and *lovely* as defining and limiting the application of the statement.

Arithmetic.

1. Ordinary bookwork.
2. 4·7688 gr.
3. Average 1 m. in 4 min.
   First min. $\frac{5}{16}$ m.
   Decrease per min. $\frac{1}{128}$ m.

English.

1. Bookwork.
2. The analysis is easy in both cases. The difficult parsing is *as* and *looker* in selection (*a*), and *pleasing* in (*b*).

N.B.—Be careful to make parsing agree with analysis.

as, Adverbial conjunction of manner.
looker, Is really an adjective, but joined with *on* becomes a noun subject to 'acts' understood. The sentence is elliptical.
pleasing, Is of the nature of a substantive, giving the second object (factitive) governed by 'to make.'

Geography.

2. Mungo Park born September 10, 1771, at Foulshiels on the Yarrow. Surgeon on the *Worcester*, sent to Sumatra. In 1793 went to Pisania, on the Gambia, for the African Association.
Discovered the Niger at Sego when escaping from Moorish captivity. Practised as surgeon in Peebles for some time. Returned to Africa in 1805, and was drowned near Boussa in tracing the course of the river.

History.

Both questions are stock and dealt with in all histories.

Domestic Economy.

1. Page 143, Nelson's 'Domestic Economy,' *et seq.*
2. Page 117, " " "

Euclid.

Bookwork.

SECOND YEAR.

School Management.

1. (*a*) Neither pure specialism nor pure class autocracy is best.
(*b*) Responsibility is necessary to secure the best work and maximum influence.
(*c*) But to the class system ought to be added the utilisation of special gifts, as in Drawing, Music, Science, Elocution, etc.
(*d*) To responsibility must be added the unity of plan coming from proper supervision, conference, and examination, but anything approaching espionage must be rigidly tabooed.
2. The point in this question is to fulfil rules 7, 8, and (*b*), (*c*), (*j*) of rule 9, given in Appendix II. of the 'Instructions to H.M.I.' (See 'N.U.T. Code,' p. 118, 119.)
3. An ordinary question dealt with in any of the books recommended.

Algebra.

1 and (*a*) of 2 are examples of the generic formula $(a^2 - b^2) = (a + b)(a - b)$.
(*b*) of 2 is $(x - 7)(x - 11)$.

English.

1 and 2 are straightforward.
3. The matter for comment is given in the notes from Stopford Brooke.

Domestic Economy.

1. (*a*) Smear shell with butter, lard, or grease.
(*b*) Steep in saturated lime water.
(*c*) Desiccation with flour, ground rice, or other farinaceous material.
2. P. 277, 457, 462, Nelson's 'Domestic Economy.'

Algebra.

Easy bookwork.

Geometry.

The bookwork is quite straightforward.
The rider on (1) is dealt with in nearly all the Euclids which pretend to give explanations or notes.
2. A simple illustration of I. 4.

SECOND YEAR.

Algebra.

Easy bookwork.

Geometry.

3. AB = CD, AC = BD } hyp.
The Δ's ABC, BCD, may be regarded as an example of I. 8, and therefore $\angle ABC = \angle BCD$, etc.

QUESTIONS FOR TESTS.

FIRST YEAR.

1. Write in large, text, and small hand:—
'Power without responsibility is tyranny.'
2. Dictation :—
About the first week in October | the rich green tint | of herbage and foliage | which prevailed through the whole summer | has usually passed away. | The brilliant | and various colours of the fern | are then in harmony | with the autumn woods, | bright yellow | or lemon colour | at the base of the mountains, | melting gradually through orange | to a dark brown | towards the summits, | where the plant, | being more exposed to the weather, | is in a more advanced state of decay. | Heath and furze | are seldom found | upon the sides of these mountains, | though their level tops and terraces | are frequently adorned | with those plants | so beautiful when in flower.

School Management.

1. Discuss the relative value of Arithmetic in a scheme of studies for children under seven and over ten.
2. Show how to illustrate a lesson on :—
(1) Carrying in Addition.
(2) $\frac{5}{8} \times \frac{3}{4}$.
3. What do you understand by 'organised play' as an educational instrument, and what are its limitations?

Composition.

Write an essay on :—
'Co-ordination and co-operation should be the guiding principles of a school.'

Arithmetic.

1. Arrange the fractions $\frac{279}{283}$, $\frac{304}{325}$, $\frac{322}{345}$, $\frac{374}{401}$, in order of magnitude.
2. Find the value of—

$$£1\ 1s.\ 1\tfrac{1}{4}d. \times \frac{\frac{30}{41} + \frac{10}{11}}{\frac{5}{33} + \frac{28}{31}} \times \frac{\frac{10}{23} + \frac{7}{20}}{\frac{15}{16} + \frac{23}{24}}.$$

3. Explain the term 'recurring decimal.' Find the recurring decimals that represent $\frac{3}{7}$, $\frac{1}{3}$, $\frac{5}{11}$, $\frac{6}{13}$, and add the results.

Needlework.

1. Show on a piece of calico two inches of each stitch required in making a chemise, and set on a button.

Music.

1. What are the mental effects of the following scale degrees when performed slowly in association with the other scale degrees?—
ray, te, doh, fah.
2. Name the following intervals :—
d—n, m—d', f—r', t_1—r_1, f—t, s—d', t_1—f, s—r'.

English.

1. How do you account for the form of the possessive case? Give some examples and exposition of the subjunctive mood.
2. Analyse and parse the words in italics :—
(*a*) 'He says it is a civil cowardice to be backward in *asserting what* you ought to expect, *as* it is a military fear to be slow in attacking when it is your *duty*.'
(*b*) 'Lotos Eaters,' Stanza VI., lines 1–6.
3. Explain and comment upon :—
(*a*) Country dance, Bully Dawson, doublet, game act, humoursome, Demosthenes, periwig.
(*b*) Clomb, galingale, sat them down, waxing, urn of brass, amaranth, asphodel.
Scan—
'Let us swear an oath, and keep it with an equal mind,
In the hollow Lotos-land to live and lie reclined
On the hills like gods together, careless of mankind.'

Geography.

1. What do you know of Durrha, baobab, gnu, gorilla, waxbill, locust, Tsetse?
2. Draw a map of Africa, showing the spheres of influence and hinterlands, with native kingdoms.

History.

1. What do you know of the constitutional changes in the later English Kingdom (950 to 1000)?
2. Write an account of the relations of James I. and Parliament.

Domestic Economy.

1. Write a short account of the teeth.
2. Describe the structure of the heart, arteries, and veins.

OR,

1. Prove Euc. I. 4, and prove :—
Any point on the vertical bisector of an isosceles triangle is equally distant from the extremities of the base.
2. What is meant by superposition, and on what axiom does it depend?

SECOND YEAR.

Penmanship.
Dictation.
Composition.
History.
Geography.
Arithmetic.
Geometry.
} As First Year.

School Management.

1. Give a summary of the rules relating to attendance registers. What precautions are necessary for half-timers?
2. Into what departments does Fitch divide instruction, and what is his view of their relative importance?
3. It is said that the order of instruction should be 'things, ideas, words.' What is the psychological ground for this dictum?
What is a term, and what kinds of terms do logicians distinguish?

Algebra.

1. Find the value of $\frac{\sqrt{ab + 4x} - \sqrt{a^2 + b^2}}{\sqrt{a^2b^2 - 4c} - \sqrt{7x + 2ab - 2}}$, when $a = 4$, $b = 3$, $c = 11$, $x = 6$.
2. Multiply $2x^3 - 3x^2y + 4xy^2 - 5y^3$ by $2x^2 + 3xy + 4y^2$.

Needlework.

1. Show on a piece of calico all the stitches required in making a boy's shirt.

Music.

1. What differences are there between a sound method of teaching the scale, and the steps as laid down in the Code?
2. Distinguish between Adagio, Andante, Andantino. How are intervals named?

English.

1. Comment on: Thane, that seems to speak things strange, proof, composition, Saint Colme's Inch, ten thousand dollars, munch, aroint thee, ronyon, ports they blow.
2. Illustrate how Shakespeare uses his authorities in the 'Merchant of Venice.'
3. Analyse lines 147–158, and parse *that* (148), *as* (149), *by* (155), *our* (158).

Domestic Economy.

1. How would you make Imperial drink, barley water, and chicken broth?
2. Write a short account of money, and methods of transferring amounts from one place to another.

MEN ONLY—FIRST YEAR.

Algebra.

1. Prove $ab = ba$, where the symbols are *any* positive integers.
2. If the difference of two quantities $= \frac{p}{q}$, then p times their sum $= q$ times the difference of their squares.
3. Solve :—

$$(a)\quad \frac{x^2-49}{7x+49}+1=\frac{2x-9}{5}$$

$$(b)\quad \frac{x}{a}+\frac{b}{x}=\frac{x+b}{a}+1.$$

Geometry.

1. Prove I. 8.
   Prove I. 9 without I. 8.
2. Find a point equidistant from three given points.

SECOND YEAR.

Algebra.

1 and 2. As First Year.

3. Divide $1+\frac{1}{a^2}-\frac{1}{b^2}+\frac{3}{ab}$ by $1+\frac{1}{a}-\frac{1}{b}$.

Find the log. to base 10 of 25 and ·03125, and the numerical value of the fifth root of ·025.

Geometry.

1. and 2. As First Year.
3. Prove III. 3.
   If a chord of a circle subtend a right angle at a given point, the locus of its middle point is a circle.

SYLLABUS OF WORK FOR THE MONTH.

Students are advised not only to get up the work indicated, but to use the test questions also as indications of work to be got up and afterwards written out.

FIRST YEAR.

School Management.

1. Objects and general principles underlying drill.
2. School museums, objects and value.
3. Comparison of Tonic-Sol-Fa and Old Notation.
   The Modulator and its uses.
   Ear Training.
   Plan of Lesson on Time.
4. Gifts I.–IV.

Composition.

1. The spread of the English language.
2. Botany as a subject for children.
3. Lotos eating.
4. Rhythm in poetry and prose.

Arithmetic.

Not less than six examples from miscellaneous sets ought to be worked per week, as well as those on the particular work set and the examination questions given.

1. Par. 35, 36, 36*, 44–46 P.
   Simple Interest.
2. Pars. 49–58 P.
   Discount.
3. Pars 72–75 P.
   Discount.
4. Pars. 97, 98, 104–106 P.
   Practical Discount.

Music.

1. First and Second Step.
2. Mental effects.
3. Chordal Teaching.
4. Revise (1–3).

English.

1. Case.
2. Number.
3. Anapæst, Dactyl, Amphibrach, Iambic verse.
4. Revise Figures of Speech.

1. Palace of Art.
2. The Club.
3. Recollections.
4. Sir Roger and his chaplain.

Geography.

1. Egypt, physical and political.
2. Madagascar.
3. Suez Canal, geographical and historical.
4. Flora of Northern Africa.

History.

1. Norman Conquest.
2. Reformation.
3. American War of Independence.
4. Addison, Blake, Wellington, Simon de Montfort.

1. Gunpowder Plot.
2. James' Political and Religious Views (Spanish Policy).
3. King and Parliament.
4. Villiers, Pym, Raleigh, Mayflower.

Algebra.

1. Multiplication.
   Arithmetic Progression.
2. Division.
   Arithmetic Progression.
3. Factors.
   Arithmetic Progression.
4. Proof of
   (*a*) $ab = ba$.
   (*b*) $(-)\times(-)=+$.

Geometry.

1. Props. IV.–X. in I.
2. ,, V. Book II.
   ,, XI.–XII. in I. Revise 4 and 8.
   ,, VI., Book II.
3. ,, XIII.–XVI. in I. ,, 5, 7.
   ,, VII., Book II.
4. ,, XVII.–XVIII. in I. ,, 13, 16.
   Revise 4, 6 in Book II.

SECOND YEAR.

School Management.

1. Fitch, Lecture II. (First half.)
   Rules for Attendance Register.
   Feeling and its subdivisions.
2. Fitch, Lecture II. (Second half.)
   Same.
   Organic Sensations—Smell—Taste.
3. Fitch, Lecture II.
   Same.
   Touch.
4. Fitch, Lecture II.
   Revise Admission Register Rules.
   Revise the Psychology.
   The Fallacy of Equivocation.

Composition.

As First Year.

Music.

1. The Divisions and their requirements.
2. Plans for sorting voices.
3. Hand signs and their use.
4. Musical terms.

English.

Macbeth:—
Act I., Sc. 3–5.
(Get up allusions—look out for parsing, etc.)
Compare Line 123 with Act I., Sc. 2, 53–4; Sc. 3, 30.
Interpretation of 20–23 in Sc. 5.
Learn I. 5, 37–53.

Merchant of Venice :—
1. Shylock.
2. Act I., Sc. 1.
3. Act I., Sc. 2.
4. Act. I., Sc. 3.

Tennyson :—
Read the 'Passing' through, noting any particular beauties or peculiarities.

Geography. } As First Year.
History. }

Algebra.

As First Year.
Also 1. Harmonic Progression.
2. Continue Logs.
3. ,,
   Revise Geometric Progression.
4. Revise Logs and Arithmetic and Harmonic Progressions.

Geometry.

As First Year.
Also 1. III. 14.
Definitions 1, 2 of Book V.
2. III. 15, 16.
Definitions 3, 4 of Book V.
3. III. 17, 18.
Definitions 5, 6, 7, 8.
4. III. 19, and revise Definition 3.
Revise Definition 5.

Needlework.

First Year.
Practise all the stitches in chemise.
Revise diagrams.
Second Year.
Similarly for boy's shirt.
Revise diagrams.

Domestic Economy.

First Year.
Par. 89–106.
Chapter on Care, etc., of Clothing.
Second Year.
As First Year.
Also Pars. 146–159.
} Nelson's 'Domestic Economy.'

NOTES ON THE SELECTIONS.—(STOPFORD BROOKE.)

Part I.

1. The 'Recollections' is a landscape poem, one of the 1830 set. Each verse is descriptive of a reach of the River Tigris.

It is *par excellence* a poem of double adjectives (golden-netted, fountain-fragrant, sable-sheeny, etc.).

2. The 'Lady of Shalott' is a pleasant piece of play—simplicity in a mask of mysticism. It was never intended to have any meaning—it grew out of pure gossamer fancy.

3. The landscape is invented in the classical poem, 'The Lotos Eaters.'

It is subsidiary to the humanity in the poem.

Its source is the 'Odyssey,' where it is said that 'whoso ate the honey-sweet fruit of the lotos had no desire to bring tidings to the ship, or to come back to it, but chose to dwell among the lotos-eating folk, and forgetful of returning, fed upon the lotos.'

Nature is made to suit the idea, as in the parallel poems, Spenser's 'Cave of Sleep,' and Thomson's 'Castle of Indolence.'

Its central idea is rest, the first sketch being the 'Sea Fairies' of 1830, the final form appearing in the recast in 1842, where first appeared the grand passage:

'Dear is the memory of our wedded lives,' etc.

giving, instead of the anticlimax of 1833, the weighty, solemn, thoughtful, classic close—leaving on the mind the sense of a dreadful woe tending on those who dream.

It is a warning to the drifters and dreamers of the world.

4. In 'Dora' the style is concise to a fault.

Its parallel is Wordsworth's 'Michael,' where the style in its slowness suits better the type of life pourtrayed.

In 'Dora,' though a little masterpiece, there is nothing in the style corresponding to the ebb and flow of circumstance.

5. 'Ulysses' was built out of his own character.

Its dominant note is the profound melancholy characteristic of the hopeless curiosity of the Renaissance.

It is the exact opposite of the 'Lotos Eaters' in its human interest of the restless dulness—the dull restlessness—the characteristic temper of Leonardo da Vinci and the Italian school generally.

6. 'Tithonus' was probably written shortly after the 'Ulysses.' It is the finer poem as a piece of art. It is the antithesis of the subjective Ulysses, and its world is the transitory dawn. The blank verse is in form consonant with the pathetic emotion of the idea, immortality without youth is an accursed gift. It is as exquisite in its tenderness as Swift's treatment for its scornful acerbity.

7. A typical memory painting.

Only a double-natured man like Tennyson, delicate and rugged, could have written it. The farmer is done by the farmer in Tennyson; but when we lay him aside all the rest is as graceful as the scenery. The music of the brook is everywhere.

The poet boy fills it with unworldliness.

The girl is happy in it, and her youth and love make it like a summer day.

There is also a little air of human sorrow, which, like a delicate mist, faintly sleeps above the poem, and softening its outlines, harmonises all.

8. The Ode was published on the day of the Duke's funeral, and revised the following year.

It is the expression of the magnanimity and magnificence, great-mindedness and great doing, which are the life-blood of a people.

Division VIII. is too exclusively English, too controversial, too much an attack on France, too contemptuous of the people whom he sees only as the mob; too fond of the force of great men to the exclusion of the force of the collective movements of the nation. It is a true lyric, its climax in its midst, not at the close.

OUR SPECIAL CORRESPONDENT AT ALTENBURG, HALLE, BERLIN, AND THE PESTALOZZI-FROEBEL HOUSE.

AMONG the interesting schools in Middle Germany which are worthy of a visit are the Herbartian Schools at Altenburg, and the Franckeschen Stiftungen at Halle. Altenburg

A PEASANT GIRL REAPING.

is the capital of Sachsen-Altenburg, which is one of the Thuringian States. It is a pleasant little town with about 30,000 inhabitants. The Duke of Saxe-Altenburg lives here, his castle, which dates from the 14th century, being picturesquely situated on a lofty porphyry rock. The peasantry in the villages around are of Wendish origin. They wear a curious costume, which appears to be comfortable, and is not unpicturesque.

The peasants are exceedingly wealthy, and the garments of this costume are made of good materials. I saw picturesque old peasant women on Sunday, with aprons and blouses made of the stiffest and richest black silk. The head covering and the curious kind of shoulder cape attached to it were of handsomely embroidered black silk, and the little, closely clinging short skirt was of finely gathered black satin. The stockings were of black silk, and the shoes of fine, good leather.

The card game of Skat, which is now universally played throughout Germany, originated among the peasants of Altenburg.

The people have reason to be thankful for their excellent schools. Dr. Karl Just is Rektor of the Girls' High Schools there, and he is also Director of all the State Schools in Altenburg. He is well known in the world of education through his pedagogical writings.

The Reichenbach School is a large people's school under Government control. I wished to know how the Herbartian principles could be carried out in a school of this kind, so I spent several days here. Rektor Ufer is the director of this

A MARKET WOMAN (BACK VIEW).

school. His work 'Vorschule der Pädagogik Herbarts,' which is translated into English, is known to many of us.

The days I spent in this school were instructive. It is a handsome modern building, three stages high. The class rooms, corridors, lighting and warming apparatus are excellent. The girls occupy one side of the building and the boys the other. Altogether there are about 1,000 children in the school. The staff consists of 20 masters and three mistresses for Needlework. It is very curious to find men universally teaching girls as well as boys in Germany, but I am bound to confess that they do it excellently. The patience and kindliness of the German man in instructing small children is admirable. All the masters in the Reichenbach School are qualified and experienced. Monitors, pupil teachers, ex-pupil teachers, and uncertificated teachers of any kind are unknown. The school life of the children consists of eight years. At the completion of the eighth school year they are usually 14 years of age, and they may leave school. The following tables show the size of the classes :—

Boys' Department.		*Girls' Department.*	
Class I*a*. ...	34	Class I*a*. ...	40
„ I*b*. ...	37	„ I*b*. ...	37
„ II. ...	52	„ II*a*. ...	35
„ III. ...	52	„ II*b*. ...	31
„ IV*a*. ...	39	„ III. ...	58
„ IV*b*. ...	40	„ IV. ...	49
„ V. ...	55	„ V. ...	50
„ VI. ...	54	„ VI. ...	51
„ VII*a*. ...	56	„ VII*a*. ...	47
„ VII*b*. ...	55	„ VII*b*. ...	45
„ VIII. ...	50	„ VIII. ...	51
	524		494

There are no schools in Germany where the attendance in the upper classes is scanty, as is frequently the case in our Standards VI. and VII. Every child must complete the 8th school year. I was impressed with the general character of the work in the first class. There is little attempt made to impart new matter during the final year, but the whole mass of knowledge in the children's minds is revised, completed, and arranged. For example, in the Geography lessons no new matter was given, but the boys were required to compare the roads and industries of Germany with those of Russia and France, and so they went on until they had systematically arranged all they had learnt in school.

The Religious instruction was the most excellent I have ever heard. Rektor Ufer gave these lessons to the first class himself from 7 to 8 o'clock in the morning. His subject was the Jewish Kings in the period of their prosperity. I regretted that I could only hear the introductory lessons. The children throughout the school spoke fluently and distinctly in spite of the difficulties of the Altenburg dialect, which had to be overcome. The boys in the first class were studying the life of Goethe, and in connection with this study they read the first part of 'Hermann und Dorothea.'

The History lessons in the lower classes were charming. I never hear the Thüringian Sagas, the Stories of the Niebelungen treasure, and Gundrun, in German schools, without wishing that we had the same wealth of materials, or that we made better use of what we have. In Class VI. the teacher gave as his aim the following question : 'Why was Count Ludwig named the Springer?' And I sat fascinated with interest as the lesson developed. I resolved, on the spot, to visit the ruins of the Castle Giebichenstein on the Saale near Halle, which was the scene of Ludwig's famous spring.

The Herbartian principles are applied broadly in the Reichenbach school. The Concentration Scheme has been worked out after years of patient thought, and the formal steps are employed in developing the subject matter of the lessons.

From Altenburg I went on to Halle. This is an ancient University town on the Saale. Last century the University was celebrated for its 'Pietistic' views. Theology and Agriculture appear to be the chief subjects which attract students here now.

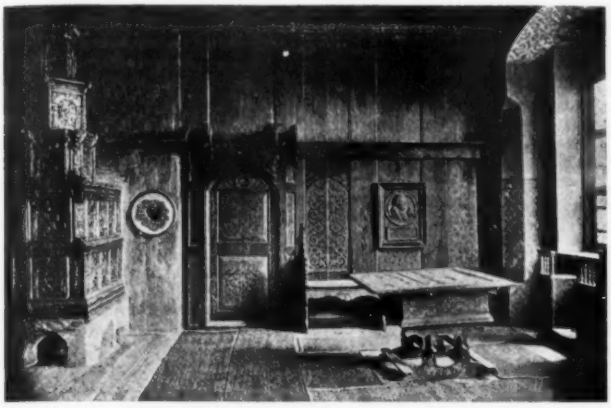
The old Market Place of Halle, with the mediæval Town Hall, its Gothic Fountain, curious Clock Tower, and Church of Our Lady with four towers, the two oldest of which are connected by a bridge, is extremely picturesque. The Franckeschen Stiftungen, however, was what I came to Halle to see, and it did not disappoint me. This consists of a little town of schools surrounded by a wall. The schools are of every kind. You enter by a gate, which is locked at night, and you find yourself in streets

STATUE OF FRANCKE.

made up of schools and buildings in connection with the schools. The whole community consists of :—

1. A Latin School, or Gymnasium.
2. A Modern School, or Realgymnasium.
3. A Town Boys' School, or Knabenbürgerschule.
4. A Preparatory School, or Vorschule.

5. A Girls' High School, or Höhere Mädchenschule.
6. A Training College for Men.
7. A Training College for Women.
8. A Free School.
9. A Town Girls' School.
10. Two Boarding-houses.
11. An Orphanage.
12. A Bible Printing-house.



LUTHER'S ROOM.

13. A Missionary Institution.
14. A Printing-office and Store for Books.
15. A Library.
16. A Museum containing a collection of Natural objects used in teaching.
17. An Apothecaries Store, where a medical man is in attendance.
18. A Hospital.
19. A Botanical Garden.

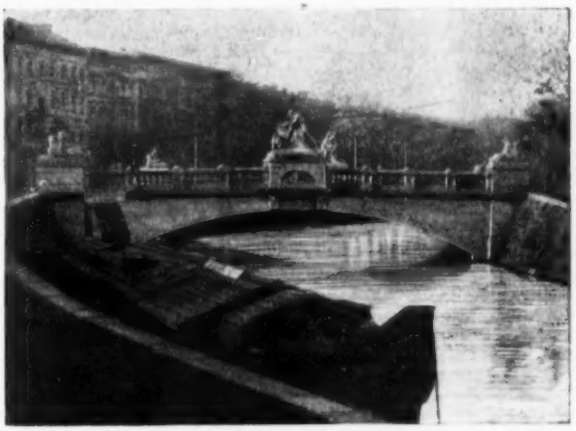
In addition to these institutions the Stiftungen possesses three farms. Over the gate of the chief building is the following inscription in gold letters :—'Die auf den Herrn harren, kriegen neue Kraft, dass sie auffahren mit Flügeln, wie Adler, dass sie laufen und nicht matt werden, dass sie wandeln, und nicht müde werden.' A bronze statue of the founder, August Hermann Francke, stands at the top of a flight of steps in the court. It represents the old man standing pointing upwards, with a child on each side of him. The inscription is simple, 'Er vertraute Gott'—He trusted God.

The statue reminded one strongly of the statue in the market place of Yverdon of Pestalozzi and two orphan children, and the story of the early work and aspirations of the two men is not unlike. Francke began his work of education in 1695. His capital consisted of seven guldens, which a certain Frau Knarr presented to him. His remark on receiving the gift was, 'This is honest money, I must use it rightly, therefore I will start a poor school.' His first school for poor children began at Easter in 1695. Francke had a great and simple faith, and this enabled him to carry on his good work. Gifts of money and land came to him from all directions, and his work grew, and at his death in 1727 he left behind him the grand array of schools which are known as the Francke-schen Siftungen. The buildings still remain that he erected, though some of the schools have changed their character, and a beautiful new High School for Girls has been recently built.

My first visit to the Francke Schools was on September 2, the anniversary of the German victory at Sedan. This is always a festival day in all the German schools.

At 8 o'clock in the morning I entered the gates and made my way to the Girls' High School. The streets were full of boys and girls, young men and maidens, all in festival attire, hastening to their respective schools. I was shown into the great school hall, where the guests were assembling, and presently all the classes came in. The girls looked charming in their fresh white and pink dresses and their abundant plaits of fair hair. The small girls were mites of six and seven years of age, and the 1st class contained girls of 17 and 18 years of age. A hymn was sung, a thanksgiving prayer was said, which was followed by an impressive address on the glories of the Sedan victory and the duty of patriotism. The national songs and war songs were sung, and poems relating to war, especially to the Battle of Sedan, were recited by various girls. The whole thanksgiving lasted until 10 o'clock, and the rest of the day was a holiday. As I walked round the square afterwards, I had evidences of other festivals. The boys from the Latin School were singing the German chorale, 'Nun danket alle Gott.' It is said that on the morning after the Battle of Sedan, the whole of the German army joined in singing this chorale, and I was reminded of this story as I listened to the boyish voices joining heartily in the grand old tune.

I heard some excellent literature and English lessons in the first and second classes of the Girls' High School, and I attended some of the lectures in the Training College. The knowledge which the girls in the second class possessed of Goethe, Schiller, Lessing, Klopstock, and their works, and even of our Milton and Shakespeare, was surprising. They were able to tell the story—in German—of 'Paradise Lost' and 'Paradise Regained,' without a moment's hesitation. They were studying Klopstock as the German Milton, and in order to understand the comparison, they were required to know something of Milton's works. I cannot understand why we spend time in teaching French and German in our schools. It is not that our boys and girls may speak, understand, and read these languages. I have frequently met girls who have done French and German for years at school, and who have passed all kinds of examinations in these languages, who are dumb and without understanding when they find themselves in France or Germany. But it is not so in German schools: languages are so taught that all the pupils can converse in and understand the foreign tongue. The girls in Class I. in the High School conversed with me quite naturally in English, and they had been learning the language three or four years. In Class II. the professor of English, Dr. Regel, asked me to tell the girls a story in English and to question them about it afterwards. He said they had heard only his English—he was a German—and he wanted to see if they could understand the English of a stranger. I told them an old Italian legend very slowly and distinctly. They were interested and attentive, and in our conversation afterwards—which was all in English—I discovered that they had all understood the story. These girls had been learning English two or three years. But we cannot do this in England because our aim is different. We prepare our pupils to pass examinations, and the Germans try to teach their pupils the language.



HERCULES BRIDGE, BERLIN.

Before I left Halle I visited the ruin of Giebichenstein Castle, which stands on a lofty rock above the Saale, from whence Ludwig took his famous leap. The history lessons that I had heard in various schools aroused all my interest. Ludwig and Luther had become very real to me, and instead of going on to Berlin I felt compelled to stop at Wittenberg and see the place where some of the famous scenes of the Reformation were enacted. The spot where Luther burned the papal bull in 1520 is marked by an oak tree, around which is a small garden railed in. In the court of what is now a seminary for priests is the Luther House, which is a part of an old monastery, and adjoining it is a Primary School which occupies a part of the same old building. The court is quaint and old with a curious fountain in the middle. The steps up the old grey tower lead to the Luther room. Here is an oak-panelled room with deep windows and curious hexagonal little panes. It contains Luther's table, his bench, his stove of coloured tiles, and a small railed kind of throne, where he and his wife Catherine used to sit. His drinking goblet is in a glass case. In the other rooms are Luther's pulpit, old translations, letters written by Luther, medals, pamphlets, and first editions of Luther's works.

The room where he used to lecture is a curious old oak room with portraits of the Electors of Saxony. It contains the arms of the four faculties of the Wittenberg University, and also paintings of Luther and Melanchthon. The house of Melanchthon is just beyond the Luther House, and in the market-place are statues of Luther and Melanchthon. In the castle church are the graves of these two great men. They are marked by great brazen slabs with Latin inscriptions. It was to the door of this church that Luther affixed his famous 95 Theses. The identical wooden door has been destroyed, but in 1858 Frederick William IV. presented the church with great metal doors upon which are inscribed the original Latin text of the Theses. Many history lessons that I had heard in German schools recurred to me as I stood in this church, particularly those which were given to a class of boys in preparation for a visit to Wittenberg.

THE BRANDENBURG GATE, BERLIN.

Berlin, with its handsome buildings, clean broad streets, its broad open spaces, palaces and statues, its masses of trees, and delightful canals spanned with picturesque bridges, is essentially a modern town, and quite unlike the quaint German towns of my earlier experiences.

Why cannot we make our canals beautiful? We usually find them in a grimy and unsavoury part of the town, and their blackness and hideousness is depressing. Here in Berlin the canals are bordered with wide avenues of chestnut, acacia, and lime trees; grassy open spaces, handsome houses, and their beautiful bridges enhance their charm.

The neighbourhood of the Hercules Bridge is clean and beautiful, in spite of the great canal barges that are passing up and down all day.

The most interesting part of the city is in the neighbourhood of Unter den Linden. This is a broad, handsome street nearly a mile long which is planted with avenues of lime trees and occasional chestnut trees. The street may be entered from the Thiergarten through the Brandenburg Gate, which was built to imitate the Propylæa at Athens. There are five different entrances, separated by massive sandstone Doric columns; the whole is surmounted by a copper figure of Victory. Palaces, magnificent hotels, and attractive shops meet one's gaze everywhere in strolling down Unter den Linden, and at the other end near the palace of the Emperor William I. is the bronze statue of Frederick the Great, which is said to be one of the finest pieces of work of the kind in Europe.

The Pestalozzi-Froebel House in Steinmetz Strasse occupied my attention for several days. This institution was founded by Frau Henrietta Schrader, a grand-niece of Froebel's, and it is under the patronage of the Empress Friedrich.

The building is not sufficient for the present number of children and students, but a new building is being erected which will be ready shortly. We talk a great deal about Kindergartens in England, and we profess to employ what we call Kindergarten methods in our infant schools, but a slight sketch of what is attempted in the Pestalozzi-Froebel House will show us that our aim and our method differ from those taught and practised in Berlin. The best Kindergartens, however, are not to be found in Germany, although they originated there, for owing to a misunderstanding in which Frederick Froebel was mistaken for Karl Froebel, his nephew, the Prussian Government forbade the establishment of Kindergartens, and this prohibition lasted for 40 years. Karl Froebel was concerned with certain Socialistic doings, and the reason urged against Kindergartens was that they encouraged Socialism. Again, Kindergartens are not officially recognised in Germany. The State demands that the children must attend school when they have completed their sixth year, but it does not provide schools for children at an earlier age, consequently the Kindergartens are the result of private enterprise and benevolence. When our insane craze to produce results has passed away, we shall probably begin to study the needs of the living child in the schoolroom, and not, as at present, out of a little psychology textbook for the purpose of passing an examination; and then we hope to be gladdened by happy, natural, unskilful, active little ones in our infant schools, instead of the silent, solemn, skilful babes, who read books and work sums, and produce finished and elegant work — which is called Kindergarten—while they are yet cutting their milk teeth. Our Infant Schools are excellent fields for the establishment of real Kindergartens, and some day when we have more faith, more money, and more teachers, we shall have them. The Pestalozzi-Froebel House in Berlin is not large nor very convenient. It consists of three working rooms, a great play-room, three small play-rooms, a room for housework, a kitchen and a room for preparing food for cooking, a play-yard, a sand garden, and a garden in which the children and students work under the direction of a gardener. The institution has a two-fold aim:—

1. To take care of and train the young children of mothers who must go to work.

2. To train young women of good position and education to understand children and their needs, and to give them an opportunity of learning to know the poor.

School life proper is not desired in the Kindergarten, but an attempt is made to establish there a healthy, moral, and religious family life. Therefore the children receive no formal instruction, but their general capabilities are to be developed through using all their powers, talents, and senses, but these powers are not to be employed for their own benefit solely, but for the benefit of others and for the community. The discipline is not the discipline of the school, but that which a loving mother would employ in a happy home.

The materials which are provided for the children upon which to exercise their activities are—

The garden, with the plants and the flowers.

Natural objects, such as sand, wood, stones, shells, moss, fir-cones, straw, hay, etc.

Industrial objects, such as paper, clay, dishes, pots, cooking apparatus, and household utensils.

Living creatures—birds, hens, rabbits, pigeons, fish, etc.

Froebel's occupations—stick-laying, tablet-laying, brick-building, paper-plaiting, etc.

Simple dolls and simple playthings, such as wooden horses, cows, elephants, trains, carts, etc.

Good pictures, musical instruments, songs, and stories.

The children are all kept busily employed, either in free play, gymnastics, walking, singing, hearing stories, learning songs, household work, or Froebel's occupations.

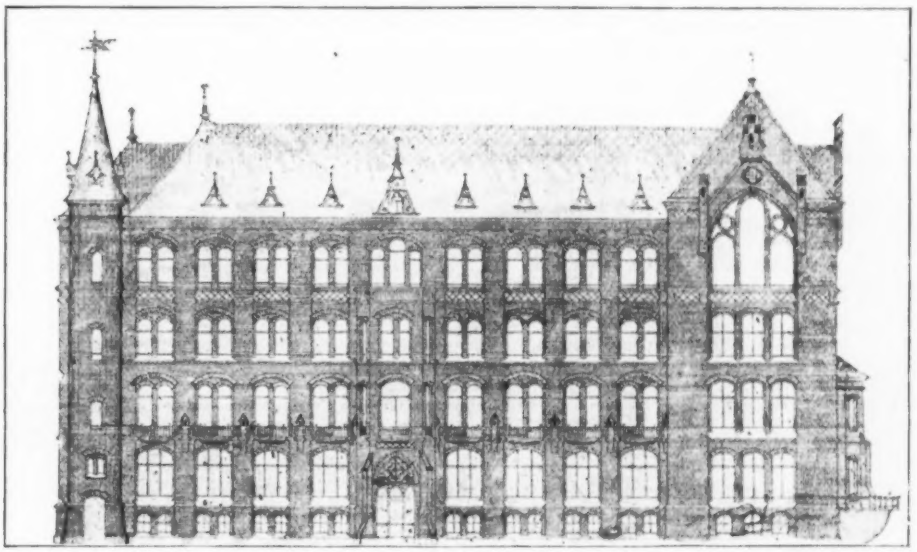
The very young children spend most of their time in free play. I saw a very happy little group of 2½ and 3½ year babes sitting around a low table enjoying themselves greatly with large, strong, wooden animals and dolls, under the care of two of the students. Very gently and very gradually are these small children led to perform regular, systematic tasks.

Frau Schrader recognises fully the need for free and undisturbed play in young children, but she also recognises in them the impulse to use their powers and to be helpful, therefore every opportunity is given them to help in the general work of the house. For instance, they are taught to take care of the Kindergarten materials and playthings, to distribute them and to put them away with care, to keep everything clean, to help to mend torn pictures and books and broken toys, to help to keep the play-room in order, to assist in the kitchen in shelling peas, picking currants, and so on, to help in laying the tables for the midday meal, and to help to wash the spoons, forks, and plates afterwards. During my visits to the Pestalozzi-Froebel House, I found one class of children at lunch. A table was decked with a white and blue cloth and bowls of flowers, at which two small girls of five years presided. The teacher cut up the long German loaves of brown bread into slices, a student buttered them, and these slices were handed round to all the little people who sat at the desks with a little wooden plate before them. I learned that the children had baked the bread themselves, and this was a special lunch in which they were enjoying the fruits of their own labour. In the work-room I found four or five little girls and boys very busy in scrubbing the wooden lunch plates. They were provided with tubs of warm water, soap, and small scrubbing brushes. Sometimes they wash the slates, or the dolls, or they polish the stove doors. In the kitchens I found half-a-dozen students, and four or five small children, under the direction of the cook, engaged in cooking the dinner. The students were making cakes, picking currants, beating eggs, preparing potatoes, and each pair of students had one or two children to help them. It is thus that the little ones indulge their instinct for household activity, and learn the blessedness of helping.

The moral and religious instincts of the children are fostered in their intercourse with Nature. They are expected to attend to the animals, to feed the hens, the rabbits, and the gold-fish, and to work in the garden. They sow seeds, clean the garden walks, clear away the weeds, and perform other garden tasks with the Kindergarten students. In the garden I found some half-dozen students at work under the gardener's direction, and half-a-dozen little children trotting round after them, carrying away the weeds, and raking the garden paths. The beginnings of the industrial activity in the little ones is developed by instructing them to manufacture articles of clay, paper, cardboard, etc., and by putting these articles to some use, or decorating the rooms with them.

The free use of slates, paper, pencils, chalk, clay, needle and thread, bricks and sticks, encourages the inventive powers in the children, and lays the foundation for a love of Art in the future.

The systematic use of Froebel's gifts and occupations in the actual performance of definite work gives the children an opportunity for exercising their intellectual activity, and helps to prepare them for real school life. The pictures, the songs, stories, and inventive games exercise the imagination of the children, and makes the Kindergarten life cheerful and merry.



PLAN OF THE NEW PESTALOZZI-FROEBEL HOUSE, BERLIN.

Each month some particular object is selected from life or Nature which forms the centre around which all the games, tasks, and occupations hang. Wheat was evidently the central idea this month, which was appropriate in September on account of the harvest, therefore the songs and the games which I heard had reference to the mill, the mill wheel, the fields of waving corn, and the baker's oven. In one class I found the children outlining in thread on cardboard ears of corn, windmills, sacks of flour, and loaves of bread. In another class-room I found a charming scene. A nicely browned crinkled cake, sprinkled with white sugar, stood on the teacher's desk, and the children were engaged in making such cakes with damp sand. Each child had Gift III. before him on the desk, which he had built into a baker's oven. On a little wooden slab he had a heap of damp sand, a little wooden cake-mould, and a little baker's shovel, made by the children themselves of silver cardboard and a piece of stick. When the cakes were made, the children trotted off to get a pinch of flour and sugar, with which they powdered the little model cakes until they had a nice frosted appearance, and

then they placed them in the oven. When the cakes were baked, they were placed on little tin dishes, and carried triumphantly to the teacher who stood at the desk. Thus the children learn to concentrate their interest upon a single object, to observe it in its various relations to other objects and to man, and also to exercise their many-sided activity in connection with the chosen object in a manner suitable to young children. 'Not Art, not books, but life itself is the basis of all instruction and all education,' said Pestalozzi. In the same way the children are accustomed to religious practices by living in a religious atmosphere. Definite religious teaching is not given, but they are surrounded by the spirit of gentleness and unselfishness. They repeat morning and evening prayers, they say grace at meals, they learn simple hymns, they see pictures of the life of Christ, and at Christmas they keep the birthday of Jesus.

The work of the Pestalozzi-Froebel House is far-reaching in its influence. It consists of—

I. Kindergarten for children from 2½ to 5½ years of age.
Transition Class. Children from 5½ to 6 years of age.
Elementary Class. Children from 6 to 7½ years of age.
Manual Work and Household Work Classes for boys and girls from 6 to 12 years of age.
II. It provides a mid-day meal for the little ones at the cost of one halfpenny or one penny.
III. It provides Bath Accommodation for the children.
IV. A Seminar for training Kindergärtnerinnen.
V. A Cooking and Domestic Economy School.
VI. A Boarding House for students who are being trained in the Seminar.

All the students who aim at becoming Kindergarten teachers in the future must work through the course in the following subjects :—

German Language and Literature.
Simple Hygiene.
The Lives of Eminent Educationists.
Natural History.
Drawing.
Singing.
The Principles of the Kindergarten.
Telling Stories and Teaching Simple Songs.
Marching and Games.
Practical Kindergarten work.
Needlework and Knitting.
Household Work.
The Physical Care of Young Children.

I saw specimens of the students' work. The models of waterfalls, farmyards, windmills, winter, etc., were very charming. Drawings of the ducks in the pond, the maize plant, and pictures from Froebel Mutter and Kose Lieder were admirably done. Among the needlework specimens were old stockings darned, old linen garments repaired, old lace mended. All kinds of children's garments fashioned by the students, such as babies' frocks, children's pinafores, knitted vests, and so on. There were also specimens of their washing and ironing, cuffs, collars, laces, baby garments and pinafores carefully washed and ironed.

Another branch of their work is cleaning and trimming lamps, manipulating spirit lamps for cooking and warming children's food. In connection with the cookery instruction the students learn how to clean babies' bottles, how to prepare babies' milk, how to prepare children's food such as simple puddings, rice and stewed fruit, eggs and egg puddings, light soups for children ; in short, they learn theoretically all about the simple wholesome diet which is suitable for children, and they are required to carry all their theory into actual practice.

The students also are required to study the common ailments of childhood and how to treat them, all the conditions of bathing, washing, dressing, as well as feeding young children, so that they may be able to care for the physical needs of the little ones under their care. All this is practical and admirable, and one feels that the ideals of Froebel and of Pestalozzi are aimed at. Froebel demanded in his plans for training young women for Kindergarten work that they should not only have opportunity for cultivation, education, and intercourse with children, but that they should also work in the house, kitchen, garden, and orchard in order to know domestic life and the life of nature intimately. Pestalozzi also, in his work at Stanz, Burgdorf, and Yverdon, demanded that the children should work in the garden, in the house, and in the field ; for only when the physical as well as the mental nature of the child is cultivated, and the desire for work aroused in the child's mind, are the highest results possible in developing the child's nature.

Therefore, Frau Schrader has endeavoured in her conception of a People's Kindergarten to carry out the ideas of both Pestalozzi and Froebel. Both these men agree in declaring that the first seven years of child life is of the greatest importance, and that much misery often results in the lives of individuals from a wrong conception of their childish needs. In the Pestalozzi-Froebel house an attempt is made to develop the natural disposition of each child ; therefore, says Frau Schrader, it is vain to look for visible results, for such can only be gained at the cost of the true development of the child. Little children must be frequently left alone with various materials to fashion what they will according to their natural taste, and we cannot expect their crude, undeveloped little fingers to produce perfect and finished work. What children of tender years want most of all is to be surrounded by a warm, loving atmosphere of family life. The stern discipline of the regular school is as much out of place in the kindergarten as is the demand for perfect mathematical designs and regular formal study from the unformed and unskilled little ones.

This is a reasonable way of looking at the matter. Let us hope that the time may come when we, too, will learn to value truly the strength of little children, and not demand from them exquisite paper-folding, drawing, modelling, as well as skill in reading, writing, and arithmetic, and intelligent judgment in answering questions and solving arithmetical problems. To develop naturally and harmoniously the child's whole nature was the ideal Froebel sought. But we forget that a developing process lasts during the whole period of youth, and we strain unnaturally in our haste to see the fruit. The child suffers, but in our educational system we are no respecter of children.

NOTES AND NOTIONS.

BY T. B. ELLERY,

Ex-President of the National Union of Teachers.

The Deane Case. Practically to a man, Deane is with Mr. Jacques. Public feeling is running high in the locality, and it is all in one direction. The trustees by this time are aware that the parents are 'up in arms' at the thought of the successful teacher's dismissal ; they are aware, too, that every step will be taken to prevent the dismissal taking effect, and they cannot be blind to the fact that the Lancashire press condemns their action in very severe terms.

'It is just possible they may proceed to extremities and eject Mr. Jacques. If this should happen, the trustees have to reckon with the N.U.T., who will fight the case to the bitter end, and they have to reckon with the men and women of Deane, who mean to 'stand no nonsense of this sort.' The trustees may still have the school buildings, but they cannot compel the children to attend their school. They may appoint another teacher, and for a time delight in paying him a salary for doing nothing, but it is certain they will not long go on paying a salary when there is no Government grant. There are other schools which the majority of these children can attend, and from the evidence which lies before me I am justified, I think, in concluding the parents will choose those schools. As to the teacher who is supposed to have accepted the appointment, well knowing the facts, I can deal with him at another time.

At the time of passing this for the press, I hear that the trustees have issued a second notice of dismissal. Only a few days ago the Deane School was struck by lightning. Some other striking events are in store.

The Ponder's End Case. It may be that, before the issue of the Journal in which these lines appear is in the hands of my readers, the decision of the Education Department as to the registers may be made public.

I understand the Law Committee is practically waiting for

MISS POTTLE.

this, nor is it easy to imagine what step can be taken until 'My Lords' have decided one way or the other. On September 9th, Miss Pottle sought an injunction in the Vacation Court restraining the Rev. Martin Sharpe and his co-managers from acting upon a notice of dismissal. The defendants pleaded that Miss Pottle was appointed by the Managing Committee to teach a non-trust mixed school, which had been built upon trust property, and that, therefore, the Committee had a right to dismiss under relations of master and servant. His lordship decided against the teacher, but this, I take it, does not prevent another action on other grounds being taken on her behalf. One thing is certain: the case will not be allowed to remain where it is. Major Bowles, M.P., has something to say, I suspect, for I know he feels very strongly on the subject. Whether the managers will accept the Major's suggestion of arbitration remains to be seen.

In the meantime, many of the parents are casting about for another school to which they may send their children, thus effectively carrying out one of the resolutions passed at the very large Ponder's End Meeting to which I have already referred—a resolution of confidence in Miss Pottle and of determination to secure justice.

The Union's Recent Tenure Cases. As I pointed out in my last contribution, the Executive of the N.U.T. has several tenure cases in hand which cause considerable anxiety. Miss Pottle's case is now well known. So is that of Mr. Jacques, of Deane. In both, arbitration has been suggested by the friends of the teacher; in both (up to the time of writing) arbitration has been declined by the managers. Is it not strange that such a satisfactory mode of settling a difficult question has not been accepted? If the managers are right—and they contend they are—what have they to fear from an impartial investigation of the facts?

Is it that they object to interference in carrying out their duties as managers, or is it that they are afraid 'to face the music'? If the former, they must be taught they are, after all, only administering public money, and cannot, therefore, plead 'privilege' when they dismiss public servants. If the latter, well—the sooner pressure is brought to bear the better, for the music *must* be faced, and that with as little loss of time as possible.

A Dismissal Prevented. The result of the Southwick School Board Election is the Union's latest victory. Southwick is about four miles from Brighton, with a School Board of five members. Briefly, the story is as follows. The Chairman resigned, owing, I believe, to failure of health. There then remained four, one of whom was strongly opposed to the teacher, and as he was Vice-Chairman of the Board and had influence sufficient to carry one other member with him, he had it in his power both to co-opt one of his own creatures and to dismiss the teacher. At this point the Law Committee of the Union stepped in, and the next incident was the resignation of the two members friendly to the teacher. Of course, the Board was then declared in default, and a new Board was ordered to be elected. Just before the election I received an invitation to attend a Committee Meeting of the three gentlemen who were pledged to secure fairplay for the schoolmaster, an invitation I at once accepted. The other side had issued a circular charging the gentlemen who had resigned, and who were again candidates for election, with having, by their resignation, caused a loss of many pounds to the parish, a certain amount of Government grant having been forfeited by the dissolution of the old Board. It was, of course, a ridiculous story, but many of the villagers believed it, the result being that the victory on the day of the poll, though perfectly satisfactory, was not perhaps as overwhelming as it would have been if there had been time to put the facts clearly before the electors.

At the meeting which I attended the plan of campaign was arranged, and it was evident there was a determination to win, and to win by honourable means. My friend and colleague, Mr. Blacker, who is well known to the Southwick people, made a capital little speech, which was extremely well received, and, later on in the contest, he rendered most effective service in many ways. Mr. Peaker, an old campaigner in School Board Elections, visited the place, spoke at the meetings, called upon the people, organised the voting, and, generally, was a host in himself. Before he left he had the satisfaction of knowing he was again on the winning side. Southwick has been true to itself, and the N.U.T. may fairly be congratulated on yet another victory.

The Teachers' Benevolent Fund. It is not a little surprising that so many teachers refrain from subscribing to the Benevolent Fund which was established nearly twenty

MR. S. HALE,
Treasurer of the Teachers' Benevolent Fund.

years ago, and which has done, and is still doing, so much good.

In many cases it is want of thought, I am sure, and it may be that in many other cases it is want of information as to

the objects of the fund. Whatever the cause, the fact remains that the list of subscribers ought to be much larger than it is, though I gladly admit that the society is splendidly supported by a very large number.

Many applications for assistance reach us from those who have never contributed a penny to this excellent charity. I have often felt that if we could publish a list of the cases considered by us in the course of a year (suppressing names, of course), sending it to every non-subscribing teacher in the country, we should at once see a change for the better. The consideration of the applications is often a very painful experience, the details in many cases being terribly sad. We are cheered, however, by the knowledge that over and over again the fund has come to the rescue of an unfortunate brother or sister at a time when no other assistance could possibly be obtained. A loan to tide over a temporary difficulty, a grant to meet expenses incurred in a long and serious illness—in a hundred ways, in fact, the Committee is able to help and cheer those who stand in need.

It would be impossible for me to give details here, and I do not, therefore, attempt to give them. One or two cases must suffice.

The Society's Good Work. A teacher, in the early stages of consumption, was recently ordered by his doctor to take a sea voyage. The cost was too great, for the teacher's salary had always been small. On the facts becoming known to the Committee, a cheque for £20 was at once sent to him, and the voyage was undertaken.

The widow of another teacher was in sore need. The Committee sent her a substantial weekly allowance until brighter days came. A young assistant teacher broke down and was ordered to Ventnor. His salary had never been more than £60, and for a long time his doctor's bills had been heavy. The Committee sent him to Ventnor, and on his leaving there made him a weekly allowance until the end came, and he was laid to rest in the churchyard of the little village where he first saw the light. One of the most recent cases is that of a teacher in the West of England, who suffered, as many do, in secret, and who bravely fought against consumption until compelled to give in. Then friends discovered the facts and appealed for him to the Benevolent Committee. There was not a moment's delay. Money was at once sent to the sufferer, and it was my pleasure at the last meeting of the Committee to see further assistance voted. The good news reached him on the Sunday; he died on the following day. He was just able to express his gratitude to those who had assisted him. Then, soon after, he passed away into the Unknown!

Before concluding this note I desire to pay a tribute to the devotion to the work shown by the Chairman, Mr. H. Wakerell, of Joanna Street Board School, S.E.; the Treasurer, Mr. S. Hale, Board School, New Road, Wandsworth Road, S.W.; the General Secretary, Mr. J. H. Yoxall, M.P.; and the Assistant Secretary, Mr. W. H. Jeffries. Let those who want further particulars send a card to 71, Russell Square, W.C.

'Tit-Bits' *v.* Mr. Ernest Gray. Since the General Election the Liberal leaders in North West Ham have been looking about for a candidate. It has been pretty freely stated, too, that united Radical support for the late member, Mr. A. Grove, could not be secured, even if that gentleman were willing to stand again. After very careful consideration, the leaders in the local Liberal camp propose to invite Sir George Newnes to contest the seat at the next election. At least, that is the report now being circulated. With Mr. Grove as an opponent Mr. Gray's success would be certain; and I do not think that the situation would be altered even if Sir George Newnes accepted the invitation which, it is said, he has received. Mr. Gray has rendered excellent service to his constituency since that memorable July when he and Mr. Yoxall scored such remarkable victories, not only for their respective parties, but also for the N.U.T., which made it possible for them to become candidates for Parliamentary honours. That being so, I am inclined to believe that Mr. Gray has nothing to fear, whoever the candidate may be, when next he is called upon to fight. I for one, at any rate, wish him many years of 'undisturbed possession.'

Since I wrote the above I hear that Sir George Newnes has respectfully but firmly declined the invitation.

Lady Jeune and her Work among the Poor. One must always have a deep sympathy with movements such as those conducted by Mr. C. Arthur Pearson (of *Pearson's Weekly*, etc.), Lady Jeune and others, the object of which is to give a holiday in the country to some of the little children whose 'homes' (such as they are!) are in Shoreditch, Bethnal Green, etc. Year after year hundreds of these poor little creatures are sent into the country, where they run wild amid Nature's beauties, enjoying the flowers, the trees and the fields, and for the time forgetting the miseries to which they must return when the happy time is over. Blessings on the head of the man or woman who makes such delights possible! I have heard much concerning the good work done by the Fresh Air Fund, of which institution the moving spirit is Mr. Pearson, to whom I have already referred. By means of this fund thousands of children have had one day's happiness among the fragrant hay, have joined in the merry ring, and have felt the 'thrill of the daring jump, and the rush of the breathless swing.' On this occasion, however, I wish to refer to the glorious work being done by Lady Jeune, who is so well-known to the poor in the East End.

Last year she was enabled, by the donations of those who responded to her appeal, to send *sixteen hundred and fourteen children* into the country *for three weeks*. Let me give a short extract from her latest appeal:—

'As an instance of the extreme poverty of some of the children I send away, I may mention the case of a little boy of twelve years, who lived with his mother and five sisters in a top room in Brick Lane. The boy was attending school, but was educated so badly, he could not work as a half-timer. The mother earned five shillings a week by match-making, and the boy, by sitting up till one or two o'clock in the morning, managed to earn half-a-crown, and this was all that there was to provide for the family, the father being an invalid and unable to do anything. The boy was rapidly getting ill, and the master of his school told me that unless he could be sent away he would die. The mother was unable to spare him on account of the money he earned, so I paid her the half-a-crown a week to make up for his earnings, and sent him away. He has now been in the country for six weeks, and it would be absolutely impossible to recognise the miserable lad who was sent down in the healthy little chap he has become. He is to remain another fortnight, and will then return to his work.

'This is only one of the many cases which I have been enabled to assist by the kindness of subscribers, who do not tie me down to any hard and fast rule. I have plenty of homes for the children to go to, and am only waiting for money to send them.'

I trust that Lady Jeune will be spared to carry on this truly Christian work for many years to come.

'I love to look on a scene like this,
Of wild and careless play,
And persuade myself that I am not old,
And my locks are not yet gray.
For it stirs the blood in an old man's heart,
And it makes his pulses fly,
To catch the thrill of a happy voice,
And the light of a pleasant eye.'

Dr. Kerr's Good Story. The official announcement of the retirement on a pension (when, by the way, will the teachers, who bear the burden and heat of the day, have the same privilege?) of Dr. John Kerr, H.M. Chief Inspector of Schools and Inspector of Training Colleges in Scotland, brings to my mind a story which I once heard him tell. He was discussing Infant Schools and the good work they were doing, and as a sort of 'horrible example,' I suppose, he told the story of the bad little boy who never went to (an Infant) School! This precocious (in some respects) youngster ran wild, read no books, and did not even attempt to become acquainted with the mysteries of the alphabet. His knowledge of language was fairly extensive, if the language itself were not particularly choice. At last it occurred to his good father that it was time to introduce books—and then the trouble began! The boy who had run wild was now compelled to sit down to the alphabet, and oh! the drudgery of it all! His progress

was by no means rapid, as may be imagined, but after a time he reached the one syllable stage. Even then it was a bore, and the lad yawned and longed for a return to the freedom he had so long enjoyed! One morning his father, stepping quietly into the room, where the young scholar was alone and trying to read that charming and elevating story of a cat with which we are all familiar, overhead the following:—'The—cat—sat—on—the—mat! The—cat—saw—a—rat! The—cat—ran—to—the—rat! The—cat—ate—the—rat! The—cat—*Oh*, —— *the cat!!!*'

The Late Mr. W. J. Atkins. Over-inspection has much to answer for. Poor Mr. Atkins was, by hereditary tendency, specially liable to mental disturbance (according to the *Birmingham Mail*), and, therefore, it would not be fair to cast the blame upon the Inspector whose 'report' upon the teacher's work was the immediate cause of the suicide which startled Birmingham a few weeks ago. On this point the paper to which I have already referred says: 'Certainly Mr. Airy has nothing to reproach himself with. He only did his duty in the very unfortunate circumstances. Mr. Atkins himself admitted that the lesson which the Inspector heard was a very bad one, but explained that he was nervous and unable to do himself justice.' Exactly! The poor fellow had been 'inspected' so much—by the Board Inspector, the Drawing Inspector, the Government Inspector, and so on—that, in his high-strung and excited condition, knowing so much depended on a good 'report,' he was not in a fit state to give a satisfactory lesson. I agree with the *Birmingham Mail*: 'It is the system of over-inspection that has to be condemned.' One teacher in the district complains that the Birmingham Board sends round a Drawing Inspector, a Register Inspector, a Manual Instruction Inspector, a Singing Inspector, and a Chief Inspector, and is by no means certain that these exhaust the list. It is to be hoped that one result of this poor fellow's death will be the adoption of a common-sense view of the teacher's work. Choose good men and then trust them. Inspect and test the work if you will, but, in Heaven's name, don't worry the workers into their graves!

I am glad to see that a subscription list has been opened, and that a sum of about £350 has been raised for the widow and family of the unfortunate teacher. That he had been a steady, careful man is proved by the fact that he had paid £200 towards the purchase of his house. The remainder of the purchase money has now been raised, and there is a balance in hand to meet immediate needs. Every reader of this Journal will sympathise with Mrs. Atkins in her terrible bereavement, and will rejoice in the knowledge that she is surrounded by friends anxious to do their best for her under the circumstances.

A Good Union Spirit. One difficulty of arranging meetings of teachers in rural districts is the expense of getting to the place of meeting.

This was well illustrated on 12th September, when the Liskeard, Launceston, and Tavistock Associations arranged a combined meeting to hear Mr. Harry Coward, Member of the N.U.T. Executive, give an address on 'What the N.U.T. has done and what it has yet to accomplish.'

Callington, the place chosen for the gathering, was the most convenient centre, although it is about nine miles from each of the towns mentioned, and as there is no railway available the journey had to be done by road.

It speaks well for the Union spirit in the far west that, notwithstanding this difficulty, over sixty teachers were present, and a most enthusiastic meeting was the result.

The Oxford University Press is making a somewhat new departure, viz., the publication of a Historical Atlas of Modern Europe in parts at a popular price, of which the first number will appear in the autumn. Mr. R. L. Poole, M.A., is the general editor, and he has been assisted by Professors Bury, York Powell, Prothero, and Tout, Messrs. R. Dunlop, F. Haverfield, C. Oman, G. H. Orpen, and W. H. Stevenson, and by other well-known scholars.

EDUCATION ABROAD.

THE 39th anniversary of the foundation of the Fédération Générale des Instituteurs Belges was celebrated at Liège on September 6, 7, 8, and 9. The programme included a reception by the Town Council, a dramatic, literary, and musical reunion, banquets, business meetings, visits to industrial establishments, and excursions to Spa and the Coo waterfall.

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AN enthusiastic appreciation of our system of polytechnics and evening continuation schools may be found in the *Journal des Instituteurs* by M. Edouard Petit. 'The continuation classes,' he says, 'are practical, technical, and professional. They are supplemented by "University extension." This is a curious phenomenon. Young masters from Oxford and Cambridge give lectures in remote towns. History, literature, and applied science are dealt with. A printed syllabus of the lectures is placed in the hands of the hearers and enables them to follow the lecturer. There are already over 400 local extension committees. Happily, the idea is penetrating into France. The word and the thing are there. University professors have gone out from Nancy, from Clermont-Ferrand, from Lille, in 1896, and have radiated outwards.' The author regrets that 'there are not among us, as in England and the United States, millionaires who transform themselves into founders of popular universities. When will there be in Paris a "Poly," where five or six thousand members may receive the physical, intellectual, musical, and social education which they need so much in that immense urban agglomeration?'

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IN the course of a chatty article on 'The influence of the nose in education,' a writer in the same paper exclaims:—'With the unfortunate tendency which we Frenchmen possess of centralising, labelling, and regulating everything, it may happen some day that a scientific and despotic Government prescribes to everyone the profession which is assigned to him by the shape and dimensions of his nose!'

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GERMAN elementary schools have existed in Paris since 1855. They were closed at the outbreak of the war of 1870, but revived a few years afterwards. They are frequented by the children of poor Hessian and Palatinatian labourers, who speak French very imperfectly. The parents usually return to their native country after eight or ten years, and the schools enable them to keep up their language and prepare the boys for the German military service. The schools are much appreciated and are not discouraged by the French Government. The German Emperor contributes 3,000 frs. yearly to their maintenance, and the Grand Duke of Hessen another 2,000 frs. The pupils pay one franc per month as a school fee. Poor children coming from the outlying districts receive a luncheon consisting of a plate of soup, a bag of roasted potatoes, and bread, for one halfpenny.

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THE annual fee for instruction at the Bavarian 'gymnasia' has now been fixed at £2 5s. per annum. In Prussia it has been raised to £6 to provide for increased salaries of teachers and directors. Those who are acquainted with the excellent character of the teaching imparted at these classical high schools will still consider the fee extremely moderate.

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THE distinguishing caps worn by the pupils of the Frederick-William Gymnasium at Neu-Ruppin, in Brandenburg, will require legal protection against unwarranted imitation. The pupils of the lower and middle schools are beginning to wear them. At a recent funeral of a teacher, whole troops of boys from the elementary schools wore caps of the colours appropriated to the fourth and fifth classes of the Gymnasium. This is said to have been a protest against the wearing of the caps as encouraging class prejudices. The Gymnasium authorities mildly suggest that pupils desirous of wearing coloured caps should choose colours different from those of the six Gymnasium classes.

A FOREIGN Office report on State encouragement given in Switzerland to commercial education gives an account of the working of the Federal Decree of 1891 authorising grants to commercial schools and societies, as an alternative to the establishment of a central school, or special professorships at the Universities. It says a great deal for local enterprise that the amount spent on commercial schools has risen from £3,944 in 1891 to £9,796 in 1895. About one-quarter of these sums was contributed by the Federal Government.

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COMMERCIAL societies have existed in Switzerland since 1863, when the first was established at Zürich, and quickly followed by others in the large towns. At the present there are 43 such societies, with 5,319 members in the principal industrial centres of Switzerland, and also in London and Paris. Nearly all these societies belong to 'the Swiss Society of Merchants,' having for its aim, mutual help; but it also exists for the development of general, and more especially commercial, knowledge among its branches and their individual members. In connection with the central society, the different local societies give supplementary commercial education by evening classes, hold examinations and grant diplomas and certificates to apprentices, clerks, and other young persons engaged in commerce. To this central committee, which meets at Zürich where it has a permanent office, the Federal Government makes grants, to be divided by it among the affiliated branches. These grants are restricted to the salaries of professors, libraries, lectures, examination of apprentices, the expenses of the registry offices and of the central office. The societies in the smaller districts must contribute at least 40 per cent. of the salaries of professors, those in the larger towns at least 66 per cent. The societies in London and Paris are treated as on the same footing as those in the smaller centres of Switzerland.

The amount of the grants to these societies from the Federal Government was, in 1894-95, 555,885 francs (£22,235.)

The total amount of Federal contribution to commercial education, including grants to both schools and societies, was, in 1895, no less than 619,135 francs (£24,765).

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A THOUGHTFUL article on 'the dangers of manual training' by Dr. Vogel appears in the *Pädagogische Reform*. Though we cannot fully endorse the contentions of the author, they may serve to point out the limits imposed upon manual training as a remedy for literary overwork. Regarding the charge often made against the ordinary school system, that it leaves many valuable faculties undeveloped, especially those of the hand and the eye, Dr. Vogel urges that the very efforts made to reproduce the exact shapes of letters in learning to write call those faculties severely into requisition. The same powers are trained by the usual exercises in drawing and caligraphy, and the faculties of exact observation and reasoning are brought into play in the elementary natural history and science lessons, and the geometrical constructions now given in the more modern elementary schools. Even the teaching of geography consists to a great extent in object lessons, and the difficulties which children often experience in locating familiar places on a map, or in interpreting its symbols, prove the reality and the necessity of the accompanying instruction. As regards the other claim of manual instruction, that it awakens the practical sense and the constructive abilities, our author denies that the school is the proper place for such awakening. The function of the school is to bring the child into touch with culture and civilisation, and to fit it for its place in the organised community. This chance of implanting ideas and higher mental aspirations should not be wasted in apprentices' work.

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DR. VOGEL protests emphatically against the practice of shutting up boys in workshops with sawdust and paste at a time when they ought to be recovering their mental powers by suitable exercise in the open air. The fact that boxes, thermometers, mirror frames, and foot-stools are turned out by boys in a manner which would do credit to a large firm of manufactures, is itself the severest condemnation of the system. What an expenditure of nerve and brain power in a pursuit which is supposed to rest the brain! The indictment is certainly powerful, but we are inclined to think that the truth lies in the middle. Most boys are disposed to construct and contrive things, and to encourage and direct this tendency can only increase their happiness and their usefulness to the community.

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SHOULD we have military drill in the public schools? is a question which Dr. Sargent, of Harvard College, answers emphatically in the negative in the *Boston Journal of Education*. 'Military drill,' he says, 'as conducted in schools is not of sufficient interest as a means of physical development to arouse any moral earnestness or enthusiasm on the part of the boys. Take away the uniforms, prize drills, public parades, brass bands, and flowers, and the exercises would be considered tedious in the extreme. During the drill the clothing is buttoned up close around the chest, and natural respiration is hindered. The muscles are not alternately contracted and relaxed but are tetanized, or kept in a state of prolonged contraction. This not only impairs the tone of the muscles used, but it also puts additional strain upon the brain and nervous system at a time when both should be as much relieved as possible. All the great military nations of the world recognise the insufficiency of the technical branches of the service as a means of developing men, and have introduced a set of gymnastic exercises into their army regulations in order to put their soldiers into better physical condition. During our civil war more than half the men who were drafted or who applied for enlistment were rejected on account of physical disability and disease. If the presumable object of introducing military drill into the public schools is to prepare our boys to be possible soldiers in time of war, would it not be a much more rational procedure in view of the fact just quoted to first train them to vigorous health by the systematic practice of all-round gymnastics and athletic exercises? We should not then have 50 per cent. of our young men exempt from service in time of war on account of physical disability, or an army of boy soldiers made vain, conceited, and *blasé* because their limited school drilling has made them think they know it all.'

* * * * * *

THE Norwegian school system is being remodelled on uniform lines. The lower grade, or elementary national school, is to be attended by all children up to their 12th year of age. The middle school has a four years' curriculum, including German and either Latin or English. The upper school or gymnasium is to comprise a course of three years. Greek is excluded.

* * * * * *

THERE are 200,000 blind people in Russia. They are looked after to a certain extent by the semi-official Association for the Relief of the Blind, which has established 21 schools for blind children, two workshops for adults, five eye hospitals, and three blind asylums. The Association also equips medical expeditions into the districts visited by eye diseases. About 11,500 operations were performed by the surgeons of these expeditions last year. The prevalence of blindness is attributed to the rigour of the winters, which impedes sanitation and proper ventilation.

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THE University of Bombay has been affiliated to the University of Cambridge.

* * * * * *

FEMALE education in Mysore is making very satisfactory progress. There are two special directions, says the *Indian Educational Review*, in which progress has been made. First, in the opening of widows' classes, where widow teachers are trained. In the report of the Education Commission, it was suggested that widows would be happier, and could live more useful lives if they could take up teaching as a profession. This idea has been carried out in Mysore. There are now about 35 widows under instruction for this purpose. They are taught in the vernacular. Some have passed the Middle School Examination, and are receiving practical education as teachers. The second point is as to the progress of Brahmin girls at school. In Madras, with all its vast advances in education, there are not more than one or two

Brahmin girls in the upper secondary stage. The Brahmin girls who do attend school are in the Primary classes. But in Mysore, 25 high-class Brahmin girls are in the upper secondary or high stage. It is very gratifying to be able to state this, because the lower classes look up to the higher for advice and guidance. They always follow the lead of the classes above them.

* * * * * *

ACCORDING to a report of the Queensland Educational Department reviewed in the *Educational Journal* (Brisbane), the average cost per head of the State elementary schools of that colony in 1895, including teachers' salaries and allowances and incidental expenditure, based on the daily average attendance, was £3 9s. 3½d. This is the lowest on record. The teachers are hoping for some turn of the tide after the severe retrenchments of 1893.

* * * * * *

WOE to the German parent who does not send his child to participate in the patriotic school celebrations! A workman of Solingen had failed to send his daughter to the Emperor's birthday celebration. He was fined 6d., this being the penalty for not sending his daughter to school. The workman appealed to the *Schöffengericht*, and the jury, in consideration of the day falling into the vacation, remitted the penalty. The Public Prosecutor appealed to Düsseldorf, and was informed that the function of the school was not limited to mental instruction, but also embraced the formation of character, especially as regards patriotism. The chief instrument for cultivating the latter was the celebration of national anniversaries. In view of this legal opinion the *Strafkammer* reimposed the 6d. fine for non-attendance at school. We have no doubt that the German national sentiment will increase and prosper exceedingly with such encouragements. The artizan of Socialist inclinations will learn that the withdrawal of his offspring from the annual demonstrations in favour of 'Kaiser und Reich' means half-a-crown out of his wages.

CIRCULAR TO DAY TRAINING COLLEGES.

Circular 390.

Waste of trained Teachers, especially of those trained for three years.

EDUCATION DEPARTMENT,
LONDON, S.W., WHITEHALL,
1st September, 1896.

SIR,—My Lords have had under consideration the question of the loss to the profession of teacher in elementary schools or in Training Colleges, caused by trained teachers either (i.) failing altogether to enter the profession, or (ii.) leaving it from causes other than advanced age or death. They observe that this loss is particularly noticeable in the case of students who have been allowed a third year of training in Day Training Colleges. As the first Day Training Colleges were opened in 1890 it is still too early to form an accurate estimate of what is likely to be the amount of the loss, but the evidence shows that out of 94 men and 15 women who received a third year of training in Day Training Colleges between 1893 and 1895, only 75 men and 8 women are still serving as elementary teachers, and that 13 of these men and 7 of the women have not entered the profession at all.

My Lords desire to draw the attention of the authorities of the Day Training Colleges to this matter, and I am to enquire whether before recommending students of your College to the Department for a third year of training, you take any, and, if so, what steps to ensure that the students shall adopt and follow the profession of teacher in a public elementary or other school specified in Article 117 (*b*) of the Code.

My Lords will also be glad to be informed whether you can suggest any additional security beyond the declaration signed by all students under the above Article, to prevent such teachers failing to enter, or abandoning after entry, the profession for which they were trained at the public expense.

I have the honour to be, Sir,
Your obedient Servant,
G. W. KEKEWICH.

To_____

_____ *Day Training College.*

THE CLASS TEACHERS' COLUMN.

BY C. H. MOORE,

Executive, N.U.T.; Ex-President National Federation of Assistant Teachers, &c.

A BRIEF period has elapsed since last I addressed my readers through these columns, but in that space of time matters educational have assumed an entirely different phase. The Education Bill of last session has been relegated to the limbo of soon-to-be-forgotten episodes. It is dead. And the sigh of relief that came from the heart of every Class Teacher when he or she realised its demise was deep and fervent. We are now engaged in anxious speculation as to what the next step on the part of the Government will be. We may feel assured that no such adventurous experiment as the late Bill will be forthcoming. Will the next measure simply be one to provide some relief for the Voluntary and poorer Board Schools? If so, I trust that something more efficacious than a four shilling special aid grant will be applied as the remedy. But is it not time for the Government to realise the shortcomings of the entire system of national education in this country? It is a system of shreds and patches. Educational management is in the hands of far too many authorities. Each authority acts for itself, and there is an utter lack of co-ordination in their efforts. The results are painful. From the Kindergarten to the University is practically an impossible achievement for the English child. And so long as this state of circumstances continues England may expect to be left behind in the international competition for racial supremacy. The unification of our educational machinery is an urgent need. It demands attention in the interests of the nation's children, to say nothing of the greater opportunities which would be presented to the already overhandicapped Class Teachers in the Primary Schools. Again I say, when will Parliament realise its serious responsibility in this matter?

* * * * *

'MADE in Germany' is a term which we are now accustomed to regard as familiar, but a close study of German progress during the past fifty years will reveal the urgent necessity for some steps being taken to meet the energy and ability of the German nation. Whilst we in England have allowed the continuance of an educational system such as I have referred to, our German neighbours have built up their success on the foundation of a national system of education which has enabled the German youth to outstrip his English cousin. And it is to the educational equipment of her children that England will have to look for the maintenance of her position. May she realise the fact before it is too late.

* * * * *

THE Executive of the N.U.T has been concerned very much lately by the consideration of a scale of salaries for rural teachers. That the remuneration of the rural teacher is disgracefully low no one will gainsay, and the Executive have displayed their willingness to do as much as possible to bring the salaries to a higher level. But on one principle the rural representatives appear to have been much misguided. I refer to the introduction of a joint salary in the scale. The scale submitted to the Executive fixed a minimum rate of £150 per annum as salary for a man and wife engaged in the same school. Now, in the first place, I fail to see any justification for the establishment of a joint salary at all. It is no argument to say that because the joint salary exists to-day we should legislate for its perpetuation. Nor can we take existing circumstances as the entire basis on which to form our decisions. We must look a little at the future. As I pointed out at the Executive, the joint salary principle is fatal to the cause of the Class Teacher. If a man and woman are engaged as Certificated Class Teachers at salaries of, say, £100 and £70 respectively, it is obviously unjust to fine them heavily because they choose to marry and accept positions in rural schools. But I shall be told that the rural master's wife is not, as a rule, a Certificated Teacher. If we accept this argument, then the N.U.T. must legislate for the perpetuation of the unqualified practitioner. Not very likely.

By the time that these words are published the arrangements for the Assistant Teachers' Conference will be in an advanced state. The most important gathering of the year, as far as Class Teachers' organisations are concerned, will be held on October 31st at the Society of Arts' rooms in London. Elaborate and hospitable arrangements are being made by the Conference Committee of the London Branch of the National Federation. A Conversazione will be held on Friday evening at the Cannon Street Hotel, and the London Class Teachers will entertain the representatives to luncheon on the Saturday at the palatial Hotel Cecil. A public reception of the Conference will take place during the day, at which the leading educational spirits in the metropolis are expected to be present. The questions for discussion are of serious moment to the Class Teachers, and, as was to be expected, many of the resolutions bear upon the present aspect of the education problem. The promotion of the Vice-President of the Federation (Mr. M. Jackman) to a headship necessitated the severance of his connection with the organisation, and the Federation thus lost one of its most ardent and valued supporters. The position thus created has solved the difficulty of carrying out the recommendation of the Burton Conference to the effect that the President should commence his year of office by presiding over the Conference at which he is elected.

* * * * *

Many of the Associations have already appointed their representatives. It is hoped that every affiliated Association will be represented at Conference, and thus assist in making the London Conference the record gathering in the history of the Federation. The progress of the Federation during the past year is very gratifying, and Conference will, I feel sure, cordially adopt the splendid report which the Federal Committee are able to present. A substantially increased membership, a wider recognition of the organisation and its aims, and a remarkable development of fraternal feeling between the Federation and our greater Union, are among the commendations which attach to our efforts since Conference assembled in Burton in October last. Now that the Class Teacher must be recognised as a permanent institution, it is necessary that such progress shall continue.

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One cannot pass from the Conference programme without an allusion to the Class Teacher who will preside over the deliberations at the Conference itself. The President of the Federation (Mr. A. Augustus Thomas, B.A.) succeeded myself in the Presidential Chair at the close of the Burton Conference. During his year of office he has been most assiduous in his attention to the cause of the organisation and of the Class Teacher generally. As a member of the N.U.T. Executive, he is devoted to the interests of the profession at large, and to those of Class Teachers in particular. A cultured gentleman, a scholar, and a thorough educationist, he is a fitting type of the Class Teacher which our present educational system has developed.

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I understand that the Assistant Teachers' Associations in Cleveland and in Liverpool are defunct. I am anxious to know what has brought this about. I am aware that the conditions of service in both places are not ideal. I also know that of all times for cohesion among the Class Teachers of the country, the present is the most important. Can any of my readers give me any information respecting the departure of these two Associations?

* * * * *

Many of us have now commenced our Evening School sessions. A consideration of the various rates of payment for this harassing extra work leads me to the conclusion that in the majority of cases where the rate is below what may be regarded as reasonable, the teachers in the schools have the remedy in their own hands. The time has long passed when persons unacquainted with the art of teaching were considered good enough for Evening School work, and now that professional men and women have been called in, their remuneration must be regulated according to their reasonable requirements. The salaries paid by many important School Boards range from 2s. 6d. to 7s. 6d. per evening for Class Teachers. Taking into consideration the facts that the work is, under any circumstances, extremely arduous, that the principle of extra pay for overtime applies to Evening Schools, and that evening teaching deprives the teacher of much valuable time, I am convinced that 7s. 6d. per evening is a fair minimum salary for the work, and if teachers would rigorously abstain from making applications for positions at the lower rates the whole question would, of necessity, solve itself.

OUR PUPIL TEACHERS' AND SCHOLARSHIP COURSE.

BY ARTHUR T. FLUX,

Head Master of the Belvedere Pupil Teachers' Centre, First on Scholarship List, Author of 'Scholarship School Management.'

PUPIL TEACHERS' COURSE.

1. For April 1897.—Sixth Month.

Work to be Prepared.

A.—*English.*

(As the special books cannot be fully dealt with in these columns, students must write for assistance in cases of doubt or difficulty.)

First Year.

1. The Verb: Classification of Weak and Strong, Regular and Irregular, Transitive and Intransitive, etc. This must be carefully prepared. Learn definitions of Mood, Tense, Voice, etc.

2. Learn the Greek suffixes, with examples—not only the meaning of the suffix, but its use.

3. Prepare verses 21–24 of Gray's 'Elegy in a Country Churchyard.' Learn the meanings of all allusions, references, and the derivations of the chief words. Use Macmillan's edition.

Second Year.

1. The Verb: Participles and Gerunds. These must be very carefully distinguished.

2. Anglo-Saxon Adjective prefixes, with examples.

3. Prepare lines 194–242 of the 'Winter Evening' (*Task*, Book IV.). Make sure of meanings, learn all notes, explanations of allusions, derivation of chief words. Be particularly careful with the paraphrasing.

Third Year.

2. Anglo-Saxon suffixes.

2. *Julius Cæsar.*—Prepare Act III., Scenes 2 and 3. Mark Antony's oration must be thoroughly mastered. Be prepared to analyse and paraphrase any part. Many of the sentences will require considerable thought.

B.—*Arithmetic.*

First Year.

Boys.—Lock. Work Example LVII. and LVIII.

Girls.—Dixon and Beach. Read Chapter XI. and work Examples thereon.

Second Year.

Boys.—Lock. Work Example CXV.

Girls.—Dixon and Beach. Read Chapters XVIII., XIX. and work all Examples.

Third Year.

Boys.—Lock. Work Examples for Exercise Nos. 926–950, pp. 283 and 284.

Girls.—Dixon and Beach. Read Chapter XXVI. and work Examples.

(Too much stress cannot be laid upon the fact that the theory, arrangement, and method are of the highest importance. To work a sum accurately is not enough. It must be a model of lucidity.)

C.—*Music.*

First Year.—Whole-pulse notes, half-pulse notes and continuations and corresponding rests.

Second Year.—Practise change of key and modulation.

Third Year.—Learn one-fourth of musical terms in common use.

D.—*Spelling*.

Learn 50 words per week from 'Words Commonly Misspelt,' or any good list, and test frequently by Dictation.

E.—*Geography*.

British North America and the United States.—

Chief points :—

The meaning of the term 'Dominion of Canada,' the States and Territories which comprise it—the chief industries and productions—the inland communications, railway and canal—the course of the Canadian Pacific Railway—some knowledge of the position, size, importance of : Quebec, Three Rivers, Montreal, Ottawa, London, Toronto, Hamilton, Kingston, Frederickton, St. John, St. Johns, Halifax, Sydney, Charlottetown, Port Arthur, Winnipeg, Brandon, Regina, Qu'appelle, Calgary, Dunorgan, Churchill, Fort York, Carlton, New Westminster, Vancouver, Victoria, etc.

Maps must be drawn and places inserted. Much information can be obtained from 'School Geography Readers,' and also from the pamphlets, handbooks, etc., which are given away by the various steamship companies, the Canadian Pacific Railway Company, and the agents for the colonies.

United States of America.—

The form of government, the various States, their leading characteristics, the industries, productions, etc. The Union Pacific Railway, the chief towns of the States, the Yellowstone National Park. Supplement Text Book by any general reading.

F.—*History*.

George III. 1793–1820.

This period is one which requires close attention. Events are somewhat complicated, and are liable to become confused unless care is taken to arrange them in note-books. The history of Napoleon's campaigns should be followed in so far as they immediately affect English History. Prepare lives of Nelson and Wellington and the Prime Minister Pitt. The policy of the English all through was to keep command of the seas, and to assist by men and money any European nation which was fighting against Napoleon. Note that the entire war added about £630,000,000 to the National Debt. The victories of Cape St. Vincent, Camperdown, Battle of the Baltic, Nile, and Trafalgar prevented Napoleon from crossing the Channel.

The Peninsular War.—Draw a large map of Spain and Portugal, enter all places mentioned, and trace the course which the various armies took. Napoleon's exile, the Hundred Days, and the Battle of Waterloo. Prepare a plan of the latter.

The Irish Rebellion and the Union, the War with the United States, the Bombardment of Algiers. The distress at the end of the reign.

G.—*Euclid*.

Second Year.—Book I. Propositions 16–19, and four deductions per week.

Third Year.—Book I. Propositions 43–46, and four deductions per week.

H.—*Algebra*.

Third Year.—Chaps. XII. and XIII. 'Scholarship Algebra.' H.C.F. Work by factors wherever possible. Learn the proof of the G.C.M.

I.—*Teaching*.

Second Year.—'Scholarship School Management,' Chapter V. The Teaching of Writing.

Third Year.—'Scholarship School Management,' Chapter X., pp. 98–106.

QUESTIONS TO BE ANSWERED.

1. *Penmanship.*—Write as specimens of :—

(*a*) Largehand : Nylephtha, Ornithorynchus, Parallelogram, Questionably.

(*b*) Smallhand :

'Though the mills of God grind slowly
Yet they grind exceeding small.'

(Take a few minutes' practice each day at this exercise, writing from a good model.)

2. Write an essay each week, selecting from : Castles in the Air—The Lake District—The Canadian Pacific Railway—Canada as a Field for Emigration—Reason in Animals—Liberty of the Press and Wild Flowers.

3. Notes of Lessons. (A criticism lesson must be given each week.) First Year P.T.'s should write outlines, all others full notes.

Autumn Leaves—A Plaice—Ice and Snow—Bricks—First Lesson in Simple Interest—British South Africa—A Thermometer—Distillation of Water—Cotton.

4. *First Year.*

1. Analyse verse 21 and parse *yet, even, these, to protect, still, erected, decked.*

(2) Analyse verse 22 and parse *years, spelt, muse, many a, round, moralist to die.*

(3) Analyse verse 23 and parse *For, prey, being, even, wonted.*

(4) Analyse verse 24 and parse *For thee, mindful, Dost, If chance, led, some.*

(5) Give the meaning of the suffix in the following words : *memorial, shapeless, moralist, Forgetfulness, anxious, mindful, artless, lonely, Contemplation.*

Second Year.

(1) Paraphrase lines 200–210 ; 213–222 ; 226–231 ; 231–242.

2. Analyse lines 200–206 and parse *when, stealing, slope, as it* and line 206.

,, ,, 207–212 and parse *were, ever yet, to fill, time unsoiled.*

,, ,, 220–224 and parse *what, dicebox, thus decked* and line 224.

,, ,, 232–242 and parse *which seen, coming home, what was nothing worth.*

3. Give the meaning of root, prefix, and affix in the following :—*Unsavoury, dialogue, complacent, superfluous, quadrangular, destructive, excursive.*

Third Year.

1. Paraphrase Act III., Scene 2.

(*a*) Here comes his body . . . .death,
(*b*) You all did see . . . .
. . . . . to mourn for him.
(*c*) Oh, what a fall was there . . . .
. . . . traitors,
(*d*) For I have neither wit . . . .
. . . . . rise and mutiny.

2. Analyse the same passages.

3. Parse—

(*a*) I do entreat you not a man depart save I alone.
(*b*) I rather choose to wrong the dead.
(*c*) As rushing out of doors to be resolved
If Brutus so unkindly knocked, or no.
(*d*) Most unkindest cut.
(*e*) You'll bear me a bang for that.

5. Give an account of the river system of North America.

6. Enumerate the chief vegetable productions of North America.

7. Explain clearly the causes which led to the American War of Independence.

8. How was the French Revolution brought about? Trace the causes which led to it.

9. *Second Year.*

How would you endeavour to secure distinct articulation in the reading of your class ?

10. *Third Year.*

What effect has the personality of the teacher upon the class ?

11. Give some account of Nansen's recent explorations.

12. What general subjects do you think Pupil Teachers ought to study in addition to their ordinary work ?

OCTOBER EXAMINATION, 1897.

FIRST MONTH.

The remainder of the time till the examination will naturally be spent in revision. The chief points were enumerated last month. The Memory Maps will need continual practice, also copy-setting. The Theory of Arithmetic must also be thoroughly prepared, if not already known.

A few hints as to the actual examination may not be out of place. Allow yourselves plenty of time to get to the place of examination. Take a good supply of all materials which you will require. Pay careful attention to any instructions which may be given you, and fill up any forms necessary, before commencing work. Divide up your time proportionately to the different subjects, divide the time to each subject into proper portions for each answer, and when you

have done this adhere rigidly to it. Spend a few minutes in deciding which questions you can answer best, and allow a few minutes for revision of each question. Map out your answer mentally or on scrap paper before you start. Be sure you understand the question. Write concisely and to the point: writing round a question is useless, and does not deceive an inspector. Work as neatly as you can: an untidy paper is always a deterrent to success. Keep your head cool, and don't get confused or nervous. Answer as many questions as you are allowed.

Finally I wish the students who have followed this course every success.

Syllabus and Text Books for 1897.

1. *Arithmetic.*

Boys.—Lock's (Macmillan & Co.). *Girls.*—Dixon & Beach (J. Hughes & Co.) will be the text-book used in the course, but any reliable 'Arithmetic' may be used to supplement the examples, such as Barnard Smith's, Brook Smith's, Pendlebury's, Rick's, etc.

2. *English.*

For Grammar, any good text-book—Daniels' (National Society), Smith's (Murray & Co.), Morris (Macmillans), Davidson & Alcock.

For Prefixes, Affixes, and Roots, 'Word Formation' by Collins (3d.) is a useful book, or Chambers' 'Wordbuilding for Standards VI. and VII.'

First Year.

Gray's 'Elegy in a Country Churchyard.' There are many editions of this work, but all students are advised to get Macmillan's Edition (6d.)

Second Year.

Cowper's 'Winter Morning Walk'—'The Task,' Book V. Chambers' Reprint at 2d. will be a useful little book, especially if interleaved by the student; but by far the most suitable edition is Macmillan's, which has been specially prepared for P.T.'s.

Third Year.

Julius Cæsar. The editions of this play are very numerous, and many of them are most suitable for P.T.'s. The following are some of the best:—

Moffatt and Paige's.—Specially arranged for Teachers' Examinations.

Macmillan's, by K. Deighton.

Blackie's Edition in the Warwick Shakespeare.

3. *Geography.*

The Subjects—Africa, America, and Australasia—require a good text-book and some amount of extra reading. Reliable text-books are:—

Brook's 'Geography.'—T. Nelson & Sons.

Meiklejohn's 'Comparative.'—A. M. Holden.

Longman's 'Geographical Series.' Book II.—Longmans and Co.

For special information about the Colonies, use Gill's (2s. 6d.).

The same firm also publish useful little Atlas Geographies at 2d. or 3d.

Much reliable and interesting information can be acquired from Geographical readers or the pamphlets and handbooks published and presented by the agents for the various colonies and the various shipping and railway lines.

4. *History.*—1689 to the present time.

Any good text-book.—Meiklejohn's, Ross, Royal, etc.

5. *Music.*—For the theory part 'Curwen's Notes for Pupil Teachers' (Stanton's) (4d.) will be sufficient. For vocal practice 'Practical Music for Pupil Teachers,' by the same firm (6d.), is an excellent little book, and one which should be used daily.

6. *School Management.*—'Scholarship and Pupil Teachers School Management' (1s. 6d.), Nelson & Sons.

7. *Writing.*—Every Pupil Teacher needs steady practice in this subject. Five minutes' work from a good model daily will do wonders. Get the 'Royal Star' Copy Books, Nos. 3 & 8 (T. Nelson & Sons) for a good, easy, and graceful style.

8. *Reading.*—Oral reading needs continual practice. Of suitable books for practice there are legions. For special work I should recommend 'Bell's Elocutionist,' or the 'Practical Elocutionist' (Blackie), as affording a wide variety of style and subject. Any standard authors may be used, but *oral* practice must be taken.

9. *Algebra.*—'Scholarship Algebra.' J. Hughes & Co. (2s. 6d.)

10. *Spelling.*—In this important subject there are numerous handbooks, of which Meiklejohn's is perhaps the best, but 'Words Commonly Misspelt,' Books 1 & 2 (1d. each), each containing a thousand words, are recommended.

11. *Euclid.*—Any good text-book.

12. *Composition.*—Though last, not least. Good composition comes from good and general reading, but there are several useful little books containing valuable hints which may with advantage be used by any pupil teacher. 'Short Essays' (Moffat & Paige), 2s. 6d., furnishes good models, 'Longman's School Composition' goes carefully into all classes of mistakes, and Macmillan's 'Civil Service Essay Writer' contains much that is apposite and useful. Such general books as 'Essays of Elia,' 'Macaulay's Essays,' 'Emerson's Essays on England,' 'Coverley Papers' from the *Spectator*, etc., are also of great assistance in furnishing food for thought and models of good taste and expression. This subject requires ever constant attention.

Work to be Prepared.

A.—*English.*

First Year.

1. Learn full and correct definitions of the parts of speech.

2. The Anglo-Saxon Noun Suffixes with meanings and examples. Not only the meaning, but also the *use* of the Suffixes must be learnt, *e.g.* to change Nouns to Verbs, etc.

3. Gray's 'Elegy in a Country Churchyard,' verses 1–4. Be prepared to analyse any part and parse any word. Learn the derivations of all important words. Notes on the difficulties in analysis and parsing will be found in Macmillan's edition.

Second Year.

1. The grammar of the Noun, classification, irregularities in formation of plurals and feminines. The Cases—nominative, absolute, of address, direct and indirect objective, etc.

2. Learn one quarter of the Latin Prefixes.

3. Cowper's 'Winter Evening.' Prepare lines 1–40. Be prepared to paraphrase and analyse any part and parse any word. The paraphrase will require great attention. The whole of the lines should be paraphrased and re-paraphrased until it becomes quite easy to render the original in your own language.

Learn the derivation of all important words.

Notes for analysis and parsing:—

Line 5.—*herald.* Nom. in apposition with 'he.'

,, 7.—*News.* Singular number, nominative absolute.

,, 8.—*True, etc.* An enlargement of 'his,' line 9. *load.* In apposition to 'charge.'

,, 10.—*to conduct.* Gerundial infinitive, forming completion of '*is.*'

,, 11.—*pass.* Gerundial infinitive, forming completion of '*is.*'

,, 12.—*wretch.* In apposition with *he.*

,, 13.—*messenger.* ,, ,, *He* = subject; *light-hearted wretch, cold and yet cheerful, messenger of grief perhaps to thousands, and of joy to some* = enlarg. of subj.; *whistles* = predicate.

,, 15.—Supply *it is.*

,, 16.—*Houses, fall, Births, deaths, marriages, epistles,* noms. to *affect.*

,, 24.—This line and the next as far as 'music' may be taken as enlargement of *its.*

,, 26.—*As if drugged with opium.* Enlarg. of *they.*

,, 30.—*Debate, harangue, reply, logic, wisdom, wit, laugh.*—Objectives in app. with *them* (33).

,, 34, 35.—*to set . . . . again.* Extension of reason to *burn.*

,, 37.—*Let.* Remember this verb takes for object a noun or pronoun and an infinitive, in this case *the curtain to fall.*

,, 41.—*Let* = pred., *us* (*to*) *welcome evening in,* object.

Third Year.

1. Learn the rules by which words of Anglo-Saxon origin can be distinguished from those of foreign origin.

Anglo-Saxon words are:—

(*a*) Nearly all monosyllables.

(*b*) Numerals, conjunctions, prepositions, pronouns, and demonstrative adjectives.

(*c*) Words which undergo vowel changes for inflexion.

(*d*) Most words which contain the combinations *wh, kn, sh, th, gl, gn,* and *ough.*

(*e*) Words with Anglo-Saxon prefixes or affixes.

(*f*) Words expressing simple ideas, names of common objects, etc., names of common actions, etc.

2. Revise the Latin Prefixes thoroughly.

3. *Julius Cæsar.* Prepare Act I., Scene 1 and 2. This will need careful attention. The meaning must be thoroughly grasped, all notes mastered, important derivations learnt, analysis and parsing of each line and word decided. Those who find difficulties in the latter respect should write for assistance. The dialogue between Cassius and Brutus is important. Cassius throughout is disguising his real motive—personal jealousy—and works upon Brutus's patriotism and family pride, veiling his attack on Cæsar under the guise of desire for the good of Rome.

B.—*Arithmetic.*

First Year.

Boys.—Lock. Read carefully Chap. III., and work all examples pp. 57–64.

Girls.—Dixon & Beach. Chap. VII., and work Ex. VII.

Second Year.

Boys.—Lock. Chap. VII., work Exs. 81 to 86, pp. 129–135.

Girls.—Dixon & Beach. Chap. 12 and 13, and work all examples thereon.

Third Year.

Boys.—Lock. Work Ex. CXXII.

Girls.—Dixon & Beach. Chap. XXIV. and Ex. XXIV. The Theory of Ratio and Proportion must be thoroughly mastered.

C.—*Music.*

First Year.

The Common Major Scale. Its structure and intervals.

Second Year,

First Removes of Key. Learn to make a modulator showing the scales of C, F, and G, with the notes in correct places. If this is known, no difficulty will be found.

Third Year.

The Minor Scale. What a Minor Scale is, the various minor modes, the changes in the pitch names; *e.g.* doh, the *tonic* of the scale of C, becomes the mediant of the scale of lah.

D.—*Spelling.*

Learn 50 words per week from 'Words Commonly Misspelt,' or any good list.

E.—*Geography.*

Africa generally. Coast line, capes, bays, islands, rivers, mountains, plains, etc. The climate in various parts and the productions.

Draw a map and insert all places to be remembered, and practise the map frequently till the places and positions are thoroughly known.

F.—*History.*

The Reign of William and Mary.

Chief points to be noted:—

Completion of the Revolution, Reduction of Ireland and Scotland, Siege of Londonderry, and the Massacre of Glencoe. The War with France. The Darien Scheme.

The principles of the following must be thoroughly grasped:—

The Bill of Rights, Mutiny Act, Toleration Act, and Triennial Act.

G.—*Euclid.*

Second Year.—Book I. Definitions, Axioms and Postulates, and Propositions 1, 2, and 3.

Practise writing these out, using different letters from your text-book.

Third Year.—Props. 26–30, with four deductions per week.

H.—*Algebra.*

Third Year.—'Scholarship Algebra.' Chaps. I. and II., with exercises.

I.—*Teaching.*

Second Year.—'Scholarship School Management.' Chap I. Study this very carefully.

Third Year.—'Scholarship School Management.' Chap. VIII. The teaching of Grammar and Repetition.

QUESTIONS TO BE ANSWERED.

1. *Penmanship.*—Write as specimens of—

Largehand—Alphabetically, Bibliography.

Smallhand—The man who makes no mistake makes nothing.

2. *Composition.*—Write an essay each week, selecting from the following:—

A Ramble in the Country—A Game of Cricket—The Importance of Trifles—The Sewing Machine—Life of Nelson—Steamships.

3. *Notes of Lessons.*—A criticism lesson must be given each week. First Year P.T.'s should write outline, all others full notes—

Stems—Water—Donkey—A Farmyard—Autumn—The Hedgehog.

4. *First Year.*

(*a*) Analyse one verse of the 'Elegy' each week.

(*b*) Parse line 3, line 6, *save where* (7), *save that* (9), *does* (10), *such as wandering* (11), *those* (13), *many* (14), *each for ever laid* (15).

Second Year.

(*a*) Paraphrase lines 1–41.

(*b*) Analyse lines 1–7, 8–11, 23–30, 36–41.

(*c*) Parse *bright* (4), *waist* (6), *news* (7), *true* (8), *what* (9), *pass* (11), *perhaps* (14), *Fast as* (19), *nymphs* (21), *budget* (23), *all* (33), *give* (35), *curtains* (37), *but not inebriate* (40), *welcome* (41).

Third Year.

(*a*) Paraphrase and analyse—

Act 1, Scene 1—

'It is no matter . . . . .
. . . . servile fearfulness.'

Act 1, Scene 2—

'Tis just and it is very much lamented,
. . . . Brutus had his eyes.'

Act 1, Scene 2—

'But wherefore do you hold me . . . .
. . . . than I fear death.'

Act 1, Scene 2—

'That you do love me . . . .
. . . . and answer such high things.'

(*b*) Parse—

'I have not that show of love as I was wont to have.'

'For let the gods so speed me.'

'What a blunt fellow is this grown to be.'

'Let Cæsar seat him sure.'

SCHOLARSHIP COURSE.

10TH MONTH—OCTOBER 1896.

1. *Reading and Penmanship.*—Ten minutes' practice daily.

2. *Spelling.*—Fifty words weekly from 'Words Commonly Misspelt,' or any good list. Test by one or two dictation exercises weekly.

3. *Composition.*—Write one or two Essays each week, selecting from—

Flying Machines.
The Lake Poets.
The Growth of the Newspaper.
Moral Courage.
South Africa as a Field for Emigration.
Co-operative Societies as an Encouragement to Thrift.
The Derivation of Geographical names.

Send up an essay occasionally for criticism.

4. *English.*

(*a*) Learn 20 roots and meanings each week.

(*b*) Revise fully the grammar of the Verb.

(*c*) *Literature.*—Revise the Anglo-Saxon period.

5. *Arithmetic.*

Read up the theory of Ratio and Proportion, and work test paper below.

6. *Algebra.*

Boys.—'Scholarship Algebra.' Chaps. XXXII. and XXXIII. and examples.

Girls.—'Scholarship Algebra.' Chaps. XIV. and XV., and examples.

7. *Mensuration.*—The mensuration of rectangles and triangles.

8. *Euclid.*—Revise Book II., Props. 1–7, and work 4 deductions each week.

9. *Geography.*—Revise the Geography of England.

Practise memory maps regularly.

Read up the various forms of government in the Colonies, how and when they have been acquired, the native races, languages, and religions.

10. *History.*—Finish the reign of Charles I. Note carefully the course of events between 1646 and 1649, and observe how the power changed hands from Parliament to the Army. Prepare the following :—

A.—Means by which money was raised during the years of personal rules.

1. Legal but vexatious.
   - (*a*) Fines for not receiving knighthood levied on freeholders above £40 a year.
   - (*b*) Fines for defective titles to estates.
   - (*c*) Fines for encroachment on forest lands.
   - (*d*) Fines for all cottages on less than four acres of land.
   - (*e*) City of London fined £33,000 for neglect in investigating into the death of Dr. Lamb.
2. Measures of doubtful legality.
   - (*a*) Proclamation for all gentry to leave London and reside on their estates. Fines for non-compliance.
   - (*b*) City of London fined £100,000 for extension beyond limits assigned by Charter.
   - (*c*) Exaction of Custom duties.
   - (*d*) Fines imposed in Star Chamber.
3. Measures clearly illegal.
   - (*a*) Selling of patents of monopoly.
   - (*b*) Demands for loans and benevolences.
4. Ship money.

B.—Migration to America.

1620.—Landing of Independent Separatists at Plymouth in the 'Mayflower.'

1629.—Charter granted by Charles to the Company of Massachusetts Bay. Great migration of Puritans, especially from the Eastern counties.

1634.—Attempt to stop emigration by the Privy Council.

1633–1638.—Foundation of Maryland by Lord Baltimore on a basis of toleration (Green).

C.—The Literature of the reign of Charles.

Ben Jonson wrote 'The Staple of News,' 'The Magnetic Lady,' 'The Tale of a Tub,' died 1637, and was buried in Westminster Abbey.

William Prynne, barrister, educated at Oxford, a Puritan who wrote many tracts on points raised in religious disputes. In 1633 he published 'Histrio-mastix' against plays, masques, balls. For this work he was committed to the Tower, prosecuted in the Star Chamber, and sentenced to a fine of £5,000, to stand twice in the Pillory, each time losing an ear, to have his book burnt by the hangman, and to be imprisoned for life. Released by Parliament in 1641.

Phineas Fletcher in 1633 published his 'Purple Island,' a long allegory in ten cantos of man and the study of mankind.

Sir John Suckling was known as a lyric poet, light dramatist, and friend of men of genius. He is mainly known now by one or two lyrics.

Sir John Denham in 1643 published his 'Cooper's Hill,' a poem on the view over the Thames from a hill near Windsor.

Richard Lovelace, a brilliant Cavalier poet who wrote many well-known pieces, such as 'Stone walls do not a prison make,' etc.

Robert Herrick, a writer of fine lyrics, including 'Cherry Ripe.'

John Milton. 1625, studying at Cambridge ; 1629, 'Hymn on the Nativity ; 1638, travelled abroad for fifteen months. Previous to this he had written 'L'Allegro,' 'Il Penseroso,' 'Arcades,' 'Comus,' 'Lycidas.' 1642, he published 'Reason of Church Government urged against Prelacy' ; 1643, married ; 1644, 'Pamphlet on Divorce' and 'Areopagitica,' a prose work in favour of freedom of the press ; and on the Commonwealth being formed he became Latin Secretary. His life should be carefully studied.

Sir Thomas Browne, 1605–1682, is best known by his 'Religio Medici,' published 1643.

Jeremy Taylor, 1613–1667, best known by his 'Holy Living and Dying.'

Joseph Hall, Bishop of Norwich, in 1640 published a treatise on 'Episcopacy by Divine Right,' and 1641, 'Remonstrance to the High Court of Parliament.'

Thomas Fuller, 1639, 'The History of the Holy War.'

D.—Social Improvements.

In 1635 the first *Letter Post* was established. Before that letters had been sent by special messengers by the sheriffs' men and by carriers. The post was further regulated by an Act passed in 1640, which established a General Post Office in London to collect letters and send them all over the kingdom and beyond the seas. The King was to appoint a Postmaster-General, and his agents alone were to have the right to dispatch letters, common carriers and shipmasters being the only exceptions to this rule ; he was also to provide horses for riding post. Letters were to be carried at the rate of 2d, a sheet for 80 miles, to be paid on delivery. Under the Commonwealth the postal arrangements were farmed out, but the Act of 1640 was confirmed in the first year of Charles II. From that time dates the privilege of Members of Parliament to frank letters by signing them, which allowed them to go free—a privilege which was enormously abused.

Hackney Coaches.—In 1634 hackney carriages first stood for hire in the streets of London, but this innovation excited alarm. It was urged that to use coaches would block up the streets, spoil the pavements, and raise the price of hay. In 1636 a proclamation forbade the hiring of coaches for distances under three miles, but the next year the coachmen got a special licence from the Court. Under the Commonwealth the number was limited to 200, and under Charles II. to 400. The watermen seriously suffered from this introduction, for the river ceased to be the great highway of the metropolis.

The Press.—The enormous number of pamphlets published shows the activity of men's minds. In 1622 the first English periodical newspaper was published. Before that time news had circulated slowly by manuscript news-letters, written in the capital and sent into the country. In 1641 many newspapers, chiefly weekly, began to appear. The *London Gazette* was started in 1665, the *Daily Courant*, the first daily, in 1703.

11. *School Management.*—Chap. XI. 'Scholarship School Management.'

12. *Domestic Economy.*—Revise Food and its functions.

13. *French.*—Next five pages of 'Le Trésor.' Practise easy composition and rendering translations of the author back into French.

14. *Mensuration.*—Area of rectangles and triangles.

Questions to be Answered.

Prepare answers where necessary.

1. Write as specimens of :—
   - (*a*) Large-hand :—
     Areopagitica.
   - (*b*) Small-hand :—
     He nothing common did or mean
     Upon that memorable scene.

2. Analyse the following, and parse the words in italics :—
   - (*a*)
     The *times have been*
     That when the brains *were out*, the man *would die*,
     And there *an end* ; but now they rise again
     With twenty mortal murders on their crowns,
     And *push us* from their stools.
   - (*b*) Lake Leman woos me with its crystal face,
     The *mirror where* the stars and mountains view
     The stillness of their aspect in each trace
     Its clear *depth yields* of their far height and hue.
     There is *too much* of man here, *to look* through
     With a fit mind the might which I behold ;
     But soon in me shall loneliness renew
     Thoughts *hid*, but *not less cherished than of old*,
     Ere *mingling* with the herd had penned me in their fold.
   - (*c*) The abuse of greatness is, when it disjoins
     Remorse from power ; and *to speak truth* of Cæsar,
     I have not known when his affections swayed
     More than his reason. But 'tis common proof
     That lowliness is young Ambition's ladder,
     Whereto the climber *upward* turns his face ;
     But when he *once* attains the *utmost* round,
     He then unto the ladder turns his back,
     Looks in the clouds, *scorning* the base degrees
     By which he *did* ascend.

3. Explain the grammatical terms :—Reflexive pronoun—disjunctive conjunction—relative adverb—neuter verb—nominative of address—adverb of degree ; making short sentences to illustrate your explanation.

4. Assign the prefixes of the following words to the language from which they are derived, and give their meaning, and, where you can, the root of the word :—acceptable, mismanage, perplex, analysis, enthrone, anarchy, interweave, sustain, antichrist, distorted.

5. Give the names of the authors of the following books, and give approximately the dates when they lived :—'Silas Marner'—'The

Virginians'—'Oceana'—'The Brut'—'Lycidas'—'Utopia'—'Hudibras'—'Holy Living and Dying'—'Gulliver's Travels'—'Robinson Crusoe'—'The Hind and the Panther'—'The Earthly Paradise'—'The Antiquary.'

6. What provinces are included in the term 'Dominion of Canada.' Who determines whether a province shall be admitted into the Dominion or not? Give brief notes of a journey from Halifax to Niagara.

7. What is our chief trade with the West Indian Islands? How was trade affected by the emancipation of slaves? Write a short account of Jamaica.

8. Say what you know of any six of these places:—Ottawa, Christchurch, Limerick, Braemar, Ballarat, the Bahamas, Montreal, Natal, Upper Burmah, Benares, Aden.

9. What is meant by the Self-Denying Ordinance, the Solemn League and Covenant, and the Petition of Right?

10. Who were the Brownists? Who were the principal leaders of the Puritan movement in England and Scotland? Why did Puritanism grow weak during the latter part of Elizabeth's reign, and then strong under James I.?

11. Write brief notes on *four* of the following:—The Millenary Petition, The Great Contract, The Addled Parliament, The Plantation of Ulster, Divine Right, The Grand Remonstrance.

12. *Boys.*

(*a*) (i.) Prove that if the numerator and denominator of a fraction be divided by the same number, the value of the fraction is not altered.

(ii.) Prove that $\cdot\dot{3}\dot{2} = \frac{32}{99}$.

(iii.) Define and exemplify Ratio, Proportion, Average, and Discount.

(*b*) Two friends start in step and walk side by side, but each step of one is $2\frac{1}{2}\frac{3}{4}$ feet, and of the other $2\frac{1}{4}\frac{7}{8}$ feet. How far will they have walked before they are in step again?

(*c*) Find the expense of papering a room 28 feet long, 20 feet wide, 10 feet high, with paper 16 inches wide at 10d. a yard, allowing for a fireplace 5 feet by 4 feet, a door 7 feet by 4 feet, and two windows each 5 feet by 3 feet.

(*d*) What sum of money will amount to £539 15s. in 6 years at $4\frac{1}{2}$ per cent. per annum, simple interest?

(*e*) Find the discount on £265 16s. $0\frac{3}{4}$d. due $2\frac{1}{2}$ years hence at $3\frac{1}{2}$ per cent. simple interest.

(*f*) What sum must a man invest in the $2\frac{3}{4}$ per cents. at 99 in order to have a clear income of £195 after paying an income-tax of 6d. in the £ (neglect brokerage).

Girls.

(*a*) (i.) Prove the rule for dividing a fraction by a whole number.

(ii.) Prove the rule for the position of the decimal point in multiplication of decimals.

(iii.) Define, with examples, Notation, Ratio, Proportion, Complex Fraction, Simple Interest.

(*b*) Divide £3 6s. 8d. among three men in the proportion of ·052, ·746, and ·002.

(*c*) One clock gains 7 seconds a day, a second loses 8 seconds a day. If they are set right at noon, what is the true time when one of them is five minutes before the other?

(*d*) Divide £10 between 4 men, 5 women, 6 boys, and 7 girls, so that each woman's share is $\frac{7}{8}$ of each man's, each boy has $\frac{1}{2}$ the difference between a woman's and a girl's share, each girl has the difference between a man's and a woman's share.

(*e*) What percentage does a shopkeeper make whose prices are 30 per cent. above cost price if he allows his customers 15 per cent. on their bills?

(*f*) In what time will £8,825 amount to £11,119 10s. at 4 per cent. per annum, simple interest?

Answers—Boys.—(*b*) $12\frac{1}{2}\frac{1}{2}$; (*c*) £9 3s. 9d.; (*d*) £425; (*e*) £21 7s. $8\frac{1}{2}$d.; (*f*) £7,200.

Girls.—(*b*) 4s. 4d.; £3 2s. 2d.; 2d.; (*c*) 12 noon; (*d*) man = 18s., woman = 14s., boy = 5s., girl = 4s.; (*e*) $10\frac{1}{2}$ per cent.; (*f*) $6\frac{1}{2}$ years.

13. Explain fully what is meant by breathing, and what is the use of it.

14. Show that mastication is in reality only the first stage in the digestive process, and describe the second stage of that process.

15. Define what is meant by 'pure air,' and show from the nature of our body the need for a constant supply.

16. How is Elementary Science provided for in the Code? What place does it occupy in the scheme of study? What is its value as a school subject?

17. What is meant by the 'law of habit'? Explain how the study and operation of this law are matters of practical importance to teachers who have charge of schools.

18. Write in the *lah* mode (*a*) an ascending minor scale, using the minor or essential sixth, and the major or essential seventh; and (*b*) a descending minor scale, using the minor 7th and the major 6th.

19. Write the following intervals:—(*a*) above *lah* an augmented sixth; (*b*) above *se* a diminished third; (*c*) above *doh* an augmented fifth.

20. Rewrite the following on the *imperfect* method. Regard the first note in (1) as *doh'*, and the first note in (2) as *me*.

(1) s l f m r f t_1 d r m fe s d' t.
(2) l t d' s l f s m f l s l t d'.

21. Write figures over the following to indicate its value (as one pulse, ½ pulse, etc.) of each note and rest:—

m, f, s :d.	m, -, f :s.
l ,, s :f, m r	s :-.

22. How would you train the upper register of children's voices?

23. State the meaning of the following terms:—(1) Transition, (2) Bridge Note, (3) Legato, (4) Agitato, (5) Fine, (6) Larghetto.

CORRESPONDENCE.

1. **Individual assistance will be given as far as possible by advice, solution of difficulties in any subjects, model answers, etc.**
2. **Specimens of Writing, Paraphrasing, Maps, Composition, etc., will be marked and criticised gratis.**
3. **To assist students in rural districts, Freehand or Model Drawings will be corrected and marked, with hints for improvement, etc., and returned if accompanied by a postage stamp.**
4. **As a rule, all replies will appear in the Correspondence Column, but anyone desiring an immediate reply may obtain it by enclosing a stamped addressed envelope.**
5. **To ensure an answer in the next issue queries must be sent by the 15th of each month.**
6. **Name and address of sender, with coupon of current number of the PRACTICAL TEACHER, and *nom de plume* if desired, must be enclosed.**

All communications and queries with regard to the PUPIL TEACHERS' AND SCHOLARSHIP COURSE should be addressed to 'A. T. FLUX, 12, Lower Park Road, Belvedere, Kent.'

ANSWERS TO CORRESPONDENTS.

W. G.—Thanks for suggestions. What sort of 'hints and suggestions' do you require? If possible, your request shall be complied with.

R. W. McL.—Analysis and parsing very well done. Writing very fair—65%. You require practice from a good model. The small-hand is indefinite and not well formed. The figures of speech are correct, but explanation is needed.

NORFOLK ISLAND.—A good map, 80%. The blue shading should be a little wider; the coast is rather too stiff. Penmanship 48/60. Capitals weak.

JOHN OF GAUNT.—Map 70%. Coast line incorrect. Keep your printing horizontal. Shade lightly. Rivers too stiff. Penmanship 40/60. Lacking in firmness. Small-hand too large. One-third size between lines is enough.

LORDS AP.—Map 75%. Shading should be wider and lighter. Coast not always accurate. Penmanship 42/60. Deficient in regularity; more distinction needed between up and down strokes.

DISCIPLINE.—Map 65%. Coast inaccurate. Keep printing horizontal, as far as possible. Writing 40/60. Shape poor, slope irregular, general lack of finish.

TEACHER.—Map 40%. Coast inaccurate. Towns very inaccurately placed; in some cases ports are placed about 200 miles out at sea. Penmanship 40/60. General lack of finish.

MER. PAR.—Map 15/60. Evidently not known. Shade wider and lighter. Writing 30/60. Capitals very poor—ugly shape—no style.

ENERGETIC.—Map 18/60. Coast very inaccurate. Printing untidy. Writing 25/60. Loose and ugly. Small-hand much too large. General absence of style.

WHITE HEATHER.—Geography. Not enough definite facts. Generalities are of no use. Bengula died years before Jameson's Raid. 15/20. Composition.—Fairly good. Many misstatements; 'The atmosphere is divided into layers.' 'Clouds contain water.' 'Clouds burst.' 25/60. Writing 50/60. Capitals want attention. History.—Tabulate the first answer. You write round the question; condense as much as possible. The only difficulty you mention is religion—the solution of it, the execution of Mary. What about foreign relations, debased coinage? No trade, no army, no fleet, etc. Second answer fairly good, but not enough detail. You do not get enough in a line—too much space.

CATSH.—Writing—an ugly style, too stiff and angular. 30/60. Get Nelson's 'Royal Star Copy Books,' Nos. 3 and 8.

M.N.—Too crowded—absence of style, 20/60. See answer to Catsh. Practise 10 minutes a day, and send another specimen in a week or two.

ARBITROR.—I do not understand what certificate you refer to. Do you mean the Society of Arts?—if so, what subject? A fairly good essay, 45/60. To make arbitration effective, all the Great Powers would have to agree to compel a country to accept the decision of a court.

MYRTLE.—Your writing is very poor. Use a finer pen, write lightly; see answer to Catsh. Essay—fairly good, 35/60. Most of your statements are very trite. Spelling also needs attention.

M.A.T.—Freehand. Good shape, lining is too stiff and wiry. Writing, 30/60. Have you got the copy books I recommended? If not, get them before it is too late. Map too small and indistinct. Print horizontally, mark position of towns with a dot. Marks 5/60.

(1) A does the work in 6 hours, ∴ he does $\frac{1}{6}$ per hour.
B does the work in 12 hours, ∴ he does $\frac{1}{12}$ per hour.
A, B, and C do the work in $2\frac{1}{2}$ hours, ∴ they do $\frac{2}{5}$ per hour.
Therefore C does $\frac{2}{5} - (\frac{1}{6} + \frac{1}{12}) = \frac{3}{20}$ per hour. $\frac{3}{5}$ of this $= \frac{1}{12}$ the amount which B does.

(2) 7 women = 4 men, ∴ 14 women = 8 men, ∴ 48 men and 14 women = 56 men.
Then (1) number of men to earn £127 1s. in 17 days = 56.
(2) number of men to earn £1 in 1 day $= \frac{56 \times 17}{£127\ 1s.}$.
(3) number of men to earn £21 3s. 6d. in $5\frac{3}{4}$ days
$= \frac{56 \times 17 \times £21\ 3s.\ 6d.}{5\frac{3}{4} \times £127\ 1s.} = \underline{28}$ men.
Number of additional men = 28 − 20 = 8, which equals $\underline{14}$ women. Ans.

POLONIUS.—A very good essay. 55/60. You should be careful to spell proper names correctly. Byron wrote largely in Spenserian stanza, not blank verse.

URSULA.—Essay fairly good, 45/60. Too many simple facts included. Grammar.—On the whole correct. You have omitted to analyse the sentence 'even while they broke them'; 'quick or dead' is an enlargement of *me*, not *them*. *While* is a conjunction, not an adverb, and *quick* is an adjective qualifying *me*. Writing decidedly poor, 10/60. Get the books recommended above, and practise diligently. You have no style at all. Map 25/30. Keep your names horizontal. Mountains in one thick line. Use a finer pen for printing.

SUNSHINE.—Essay fairly good, 45/60. Your answer is, however, more an answer in Physical Geography than an essay. If you want a model, see *Clouds* in Ruskin's 'Frondes Agrestes.'

S.S.—Essay 45/60. See note immediately above.

ASPIRANT.—Writing 55/60. Slope not quite uniform. Capitals require some attention. Essay very good, 58/60. Avoid being verbose; write as tersely as you can, and you will do well.

ANSWERED BY POST.—L.J. (Oswestry); E.A.W. (Stockport); F.J.E., F.J.G. (Brighton); M.A.B. (South Shields); S.L. (Leytonstone); F.W.G. (Bristol); K.J.B. (Malmesbury); E.J. (Camborne); G F.W. (Sandhurst); F.C.W. (Worthing); F.P. (Peel); C.S. (Wallsend); M.G. (Korsforth); H.D. (York); Louie; E.S. (Thirsk); J.E.C. (Cannock); G.B. (Norwich); K.L. (Stoke); J.E. (Aberdare); R.W. (Dewsbury); L.M. (Rotherham); E.C. (Dereham), C.O.R., N.H.R. (South Molton); Diamonds; J.M. (Blackpool); E.G. (Tadcaster); L.M. (Rotherham); W.L.P. (Lincoln); Kathleen, W.C. (Middlesboro); J.H.T. (Camborne); M.H. (Manchester).

Professor John Stuart Blackie will be the subject of Mr. Cartwright's next contribution under the title of 'Modern Educational Reformers.'

RESULTS OF THE ESSAY COMPETITION.

OUR remarks last month have resulted in an increased number of essays, the majority of good character, but it is still to be regretted that so few, comparatively, have thought it worth their while to compete. Many of the essays submitted are really excellent, and it is only after considerable thought that the Prize of One Guinea is awarded to

MISS BELLA LYALL (First Year),
Public School,
Buckie, N.B.,

whose essay on 'Dickens' is a most able one. Coming very near to it are *Jim* (on 'Walter Besant'), *Heathen Chinee* (on 'George Eliot'), and *Horatius* (on 'Horace'). In the FIRST CLASS, I place:—*Pickwick*, *Hopeful*, *Umble*, *Meg Merrilies*, *Dickens*, *Vagus Hercules*, *Hopeful*, *Perity*, *Erimus*, *Socrates*, *Xerxes*, *Waverley*, *Prudens*, *Ivan*, '*Aye Ready*,' *El Dorado*, *Mek*, *T.O.P.*, *New Woman*. In the SECOND CLASS:—*Edgehill*, *Scribo*, *Ivanhoe*, *Cynllo*, *Clwyd*, *Thalia*, *Lion*, *Eugenie*, *Honeysuckle*, and *Heather*.

The chief defects were: (1) in those essays on 'Favourite Author,' detailing the life of the writer selected, instead of criticising the works, and (2) in the other essays, in failing to point out the cause of the difficulty. In many of the latter the fact that a difficulty was experienced was palpable, but very few attempted to analyse the causes, and then suggest a remedy.

The general style throughout was good. Some few instances of vagueness, incorrectness of grammar, misspelling occurred, but on the whole the essays are decidedly creditable.

OUR SCOTCH LETTER.

Further Inspectorial Changes. Among the changes in the Scotch Inspectorate, consequent upon the retirement of Dr. Kerr, are the following, which will complete the re-arrangement for the present:—Mr. John Struthers, who has for a number of years been Dr. Kerr's colleague in Edinburgh, goes to Perth to take charge of that district in place of Mr. Alexander Walker, promoted to the Chief Inspectorate at Aberdeen. Mr. D. Munro Fraser, at present Dr. Ogilvie's colleague in Glasgow, goes to Edinburgh with his chief, and fills Mr. Struthers's place there, and will be succeeded in the West by Mr. Jamieson, who has been recently appointed H.M.I. The Perthshire teachers are to be congratulated upon getting Mr. Struthers, who is one of the ablest and most enlightened educationists in the Inspectorate. Edinburgh teachers will part with Mr. Struthers with regret, but it is a satisfaction to them to know that Mr. Fraser is likely to prove a worthy successor.

The Sub-Inspectorate. *Apropos* of the appointment of a new Inspector, was it not expected that the raising of the status of Inspectors' Assistants to that of Sub-Inspector was likely to be followed by their promotion to the position of Inspector as opportunity occurred? There are in the ranks of the Sub-Inspectorate men quite equal in scholarship and culture to those who are brought in from the outside, and it does seem absurdly unfair that such men, with large experience in the work of inspection, should be passed over in favour of others who have to undergo a course of training in their duties under the very men whom they supersede. Both from the point of view of the Subs. and from that of the schools, there is ample room and considerable need for the discussion of such an appointment as that now made by Lord Balfour.

The Half-Time System. The report of Mr. Keith, Drumgeith, and Mr. Robb, Kircaldy, on the Half-Time System, to the Special Committee of the Educational Institute, is an able and exhaustive one. There will be very general agreement with them that the system is a vicious one, and ought, if possible, to be abolished. This cannot, they admit, be done at one swoop, but they will have the support

of all friends of education in their recommendations that the age for partial exemption should be raised to twelve years, and the standard for total exemption to the sixth.

The Equivalent Grant. Much dissatisfaction is being caused amongst teachers by some School Boards making use of the Equivalent Grant for the reduction of rates. Considerable sums of money are being granted for the encouragement of the higher work in their schools, and yet in certain cases no addition is being made to the staffs of the schools or to the salaries of the teachers for the extra work thrown upon them. The Educational Institute is acting wisely in seeking to expose such action on the part of the School Boards, and we trust the request of the *Educational News* will be complied with, and the editor furnished with a list of all Boards applying the Equivalent Grant to reduction of rates.

Games and Athletics in Modern Education. At the breaking up of the schools for the summer vacation, especially in the higher-class schools, many of the speeches had reference to the position of games and athletics in our modern education. Many people will agree with Lord Harris and other speakers that the tendency has of late years been to magnify the importance of this side of education, and their warning that this tendency may be carried too far will be welcomed by all who wish to see a fair balance preserved between the claims of our bodily and mental energies.

Dr. Kerr's Report on Training Colleges. Dr. Kerr, in his report for 1895 on Training Colleges, calls attention to a real evil in connection with the long period that elapses, in the case of Queen's Scholars, between the date of examination in December and the date of admission in October of the following year. His exposure of the serious objections to this long interval is so clear and convincing that it is to be hoped means will be found to bring the two dates much more closely together.

Dr. Craik's Report on the Leaving Certificate Examination. Dr. Craik's remarks on the teaching of English, taken along with the reports of many of Her Majesty's Inspectors on the same subject, forebode a probable modification at no distant date of the requirements in grammar and analysis. There is no doubt whatever that far too much time is spent on these subjects. and that part of the attention at present bestowed upon the intricacies of grammar and analysis could be much more profitably spent upon composition. So long, however, as grammar holds the position it does in the Code, teachers cannot help themselves. It is their duty, as it is their interest, to teach up to the Code, and a change in its requirements will very speedily be followed by an improvement in the desired direction.

The New President of the E.I.S. The new method of voting has resulted in the return of Mr. John Adams, M.A., B.Sc., Rector of the Free Church Training College, Aberdeen, as the President of the Educational Institute of Scotland for the year 1896–97. A comparatively small proportion—scarcely more than half—recorded their votes, which goes to show that the desire for a change in the mode of election had not been so widespread as was supposed. Mr. Adams is a man of very exceptional ability, and will be a worthy addition to the long list of distinguished men who have preceded him in the chair.

Drawing Certificates. It may be of interest to know that Drawing Certificates can been obtained up to the end of this year on the following conditions, as laid down in the Science and Art Directory for 1895 :—"Until 31st December, 1896, certificates of qualification to earn grants on the teaching of Drawing in Elementary Schools may be granted to teachers who do not hold the Elementary Drawing Certificate, but have taught Drawing in schools which have obtained two or more good reports since August 1891, provided that such teachers satisfy the following conditions :—(1) They must have been recognised by the Education Department as teachers of Elementary Schools for at least seven years previous to 1st September 1891, when Drawing was made a compulsory subject of instruction for all boys in schools for older scholars; and (2) they must present a certificate, if required by the Department, from the managers of the schools in which they have taught Drawing, that instruction in that subject was given by them regularly throughout the period in which the schools obtained the requisite report." This article evidently has reference to England, as Drawing, even for boys, is not compulsory in Scotland, but presumably certificates will be granted to Scotch teachers on the terms offered to their English brethren.

Drawing in Elementary Schools. In the new regulations for Drawing we find the following :—"Where the award is lower than the previous year the grant will not be reduced without a warning, unless there is a very marked falling off in the work done." This is so far good. It would be another step in the right direction if the Science and Art Department would, in every case in which the highest award is not made—and that is in Scotland, at least, in about 999 cases out of the 1,000—report where the weaknesses lie. When the award falls from a higher to a lower grade this should invariably be done, in fairness to Board and teachers. It is unfortunate that the awards of the Science and Art Department are very generally considered by teachers, and luckily for them by School Boards also, to be capricious and utterly unreliable. We even know of a case in which the Department, on being appealed to by a dissatisfied teacher, reconsidered and raised the award intimated to his Board. If the Department has not confidence in itself, it is not surprising that the public should have little confidence in it.

Halkirk School Board and the County Council. It will be in the recollection of our readers that a teacher under the Halkirk School Board, who had been returned to the County Council, was called upon by his Board to resign either his seat on the Council or his position as teacher. The teacher, being powerless against his Board, tendered his resignation to the County Council. It is gratifying to notice that the County Council supports the contention of the teacher that he was quite within his right in taking office as a County Councillor, seeing that the work did not interfere with his school duties, and has delayed accepting his resignation until a new School Board has been elected. We trust that the result will be the vindication of the teacher's position that he is master of his own spare time.

Needlework in Training Colleges. The report of the Directress of Needlework on Needlework in the Training Colleges of Scotland for the year 1895 has recently appeared. It points out that the requirements have been so greatly reduced as now to admit of no complaint. We should like to hear what the students have to say in the matter. Whether or not the departmental syllabus is to blame, there is a very general opinion that the amount of time required of students for this subject is excessive. Needlework, many think, might very well be placed on the same footing as Geography and History, and exemption made in the case of students who had given proof of satisfactory acquirements at the admission examination. The time at present spent on needlessly fine sewing could then be utilised for the instruction of the students in the art of teaching this subject, a branch of school work in which there is said to be considerable room for improvement.

The Arnage Case. The Arnage Dismissal Case is causing great excitement and indignation in the North. The teacher, from all accounts, seems able, enthusiastic, and successful, and is held in high esteem by Inspectors, parents, and the teachers of the district, in fact, by everyone except his Board. We are delighted to find that one teacher after learning the facts of the case has refused to accept the vacant office, and we sincerely trust that no one will be found willing to take the appointment until some valid reason for the dismissal can be adduced by the Board.

Superannuation. Mr. Kerr is entitled to the gratitude of the teachers of Scotland for the persistency with which he has pressed, and is pressing, the subject of Superannuation of Teachers on the attention of the public. We are glad to learn from his latest utterances that he believes something practical will ere long be done in the way of making a start with a Scotch scheme. We venture to appeal to all teachers not yet members to join the ranks of

the Educational Institute, and thus strengthen the hands of Mr. Kerr and those who are working with him for the good of the profession.

The Pupil Teacher System. } Miss Rayner, Mistress of Method, Episcopal Training College, Edinburgh, has been discussing "the Pupil Teacher System as suggested by the 1895 Code." Miss Rayner gives an admirable history of the rise and growth of the system, and seems to make out a good case for its continuance. Her claim for the Pupil Teachers that they have had a large share in bringing about the present educational prosperity of our Elementary Schools will by many be fully admitted. It is questionable, however, in these days of reduced hours of service, and, under an increasing number of Boards, even half-day attendance, whether the Pupil Teachers are, as part of the teaching staff, worth all the trouble that has to be spent upon them. The whole question of the training of teachers yet remains to be settled.

NEW PROBLEMS IN ARITHMETIC.

BY T. B. ELLERY, F.R.G.S.
Ex-President of the National Union of Teachers.

THIRD SERIES.

STANDARD IV.

Every exercise here given will suggest to the practical teacher many others of the same kind. May I say, too, that the blackboard should be freely used in the solution of these problems.

Some of the exercises may, perhaps, be considered too difficult for the particular Standard in connexion with which they are set, but they are given for the purposes of blackboard lessons and as a preparation for more advanced work.

Each exercise should be written on the board, read by the teacher, and then by the class. Every effort should be made to encourage the children to think, and to this end preliminary mental practice should be given before any one problem is attempted.

A.

1. A man travels 134 miles at the rate of 2½d. a mile. What change will he receive from £5?

2. A man's earnings in 96 days amounted to £26 8s. What is that for a week of 6 days?

3. How many pairs of boots at 6s. 8d. a pair must be given in exchange for 160 pairs at 5s. 10d. a pair?

4. A man earns 4s. 8d. a day, and his wife one-half that amount. How long would they take together to earn ten guineas?

5. A boy earns £6 13s. 4d. in 80 days. What, at this rate, does he earn in 3 days?

6. A woman bought a chest of tea weighing ½ cwt. and a cheese for £5 5s. 4d. The cheese cost 12s. What did a pound of tea cost?

7. I had ten guineas in my purse. Of this I gave one-half to a number of men, and the rest in sixpences to a number of boys. How many boys received 6d. each?

8. A shirt requires 3 yards of flannel at 11½d. a yard. How many shirts can be bought with 17s. 3d.?

9. A postman walks 18 miles every week day and 10 miles on Sunday. How many miles does he walk in a year of 52 weeks, allowing for one week's absence from work, owing to illness, and two weeks' holiday?

10. A boy saved half-a-crown a week for 63 weeks, and then bought a bicycle, costing nine and a half guineas, his father paying the remainder. How much did the father pay?

11. A man buys books for which he pays £14 5s. 30 books cost 5s. each, 20 cost 2s. 6d. each, and the rest 1s. each. How many books at a shilling did he buy?

12. A man paid £54 for coal at 1s. 1½d. per cwt. How many tons did he buy?

13. A man bought 2½ dozen sheep at £1 18s. 6d. each; 8 of these afterwards died, and he sold the rest at £2 5s. 6d. each. What did he gain or lose?

14. The railway fare from X to Y is 9s. 10d. What would 18 men and 32 boys pay in travelling from one place to the other, the boys paying half fare?

15. A lady had £16 8s. 6d. She gave £3 7s. 6d. to one woman and £8 5s. to another woman. The rest she divided equally among 7 boys and 5 girls. How much did each boy receive?

B.

16. How many half-crowns must you give in exchange for 460 florins and 96 crowns?

17. I take 80 steps, each 2½ ft., in a minute. How long, at this rate, should I take to walk 4,000 yards?

18. I buy 20 gallons of milk at the rate of 3s. 4½d. for 3 gallons, and sell at 2¼d. a pint. Find my gain.

19. 100 öre = 1 krona (Sweden). 18 kronor (plural of krona) = £1, English money. How many £'s, etc., are equivalent to 2,700 öre?

20. A tea merchant received weekly 21 tons of tea in boxes, each containing 1¾ cwt. How many boxes did he receive in a year and a half?

21. A fruiterer buys 80 dozen apples at six a penny, and sells 25 dozen at a halfpenny each, and the rest at a farthing each. Find his gain.

22. A milkman paid £12 11s. 8d. for 300 gallons of milk. Of this quantity 140 gallons cost 9d. a gallon. What did he pay per gallon for the remainder?

23. A gentleman took 8 boys for an excursion, the return tickets being 5s. 9d. each. Three of the boys were charged half fare. What change from a £5 note did the gentleman receive when paying for the whole of the tickets?

24. Three consignments of butter, weighing respectively 1¾ cwt., 2 cwt. 16 lb., and 3 cwt. 1 qr., were sold for £51 13s. 4d. What was that per lb.?

25. A woman bought ½ cwt. of butter at 1s. 2d. a lb., and sold the whole at a gain of 16s. 4d. At what price per lb. did she sell it?

26. Slates are bought at 2s. 6d. a dozen. How many slates can be bought with 9s. 4½d.?

27. A man buys 250 gallons of milk at elevenpence halfpenny a gallon, and sells one half of it at 3½d. a quart, and the other half at 4½d. a quart. Find his gain.

28. A gentleman's income is a farthing every second, day and night, and his expenses amount to £5 every four hours. What does he save in a day of 24 hr.?

29. If a stone and a half of sugar cost 6s. 1½d., what would you pay for a pound and a half?

30. I have £3 2s. 9d. in pennies and £2 18s. 4d. in halfpennies. Find the weight in lb. and oz., allowing that 3 pennies or 5 halfpennies equal 1 oz. in weight.

C.

31. A man bought 1 ton 1 cwt. of coal at 15s. a ton, and sold it at 11½d. per cwt. Find his gain.

32. Take 2½ guineas from £7 and divide the remainder between a man and his son, giving the man as much again as the son.

33. A man receives 16s. 3d. every 3 days, and spends 2 guineas every 12 days. How long will he take to save £5 15s.?

34. A boy was asked to multiply 2 yd. 2 ft. by 36, and instead of this he multiplied 2 ft. 2 in. by 36. What was the extent of his error in inches?

35. A grocer buys sugar at the rate of 7s. per cwt., and he sells it in 7 lb. parcels at 8½d. per parcel. Find his gain on the sale of 84 lb.

36. A man sold a number of pairs of boots at 7s. 6d. a pair, and an equal number of pairs at half-a-guinea a pair, and received in all £54. How many pairs did he sell altogether?

37. A man bought 6 bus. 2 pk. of potatoes at 1s. 6d. a bushel, and sold them at 6d. a peck. Find his gain.

38. ½ cwt. tea and ¾ cwt. sugar cost £8 9s. 2d. The sugar being sold at the rate of 4 lb. for 6d., find the cost of a pound of tea.

39. The sum of £15 2s. 6d. was divided among 28 men and 54 women, each man receiving as much again as a woman. How much did a man and woman receive together?

40. The sum of £8 10s. 6d. was divided among A, B, C, and D, A receiving 16s. 6d. more than either of the others. How much did A and C receive together?

41. The sum of £38 is divided among 44 men and 28 women, each man receiving 12s. 6d. How much is received by a man and a woman together?

42. A man bought a dozen pieces of cloth, each measuring 15 yards, at the rate of 3 yd. for a crown. He sold the whole at 2s. 10d. a yard. Find his gain in guineas.

43. A wine and spirit merchant bought 16 gal. of wine at the rate of 3 gal. for £2 10s., and he sold it at 3s. 6d. a bottle (6 bottles to the gallon). Find his gain.

44. I have £3 10s. 1d. in a purse. I buy 1,840 pencils at 5 a penny, and, with the remainder of the money, I buy stamped envelopes at 10 for 11d. How many stamped envelopes do I buy?

45. A train starts from X at 6.20 a.m., and proceeds to Y, a distance of 198 miles, reaching there ten minutes before noon. What was the rate of travelling per hour?

ANSWERS.

1. £3 12s. 1d.
2. £1 13s.
3. 140 pairs
4. 30 days
5. 5s.
6. 1s. 8d.
7. 210 boys
8. 6 shirts
9. 5,782 miles
10. £2 2s.
11. 85 books
12. 48 tons
13. Lost £7 14s.
14. £16 14s. 4d.
15. 8s.
16. 560 half-crowns
17. 1 hour
18. 7s. 6d.
19. £1 10s.
20. 18,720 boxes
21. 12s. 11d.
22. 11d. per gallon
23. £2 16s. 10½d.
24. 1s. 3½d.
25. 1s. 5½d.
26. 45 slates.
27. £4 13s. 9d.
28. £60
29. 5½d.
30. 33 lb. 3 oz.
31. 4s. 4½d.
32. Son, £1 9s. 2d.; Father £2 18s. 4d.
33. 60 days
34. 2,520 inches
35. 3s. 3d.
36. 120 pairs
37. 3s. 3d.
38. 2s. 10d.
39. 8s. 3d.
40. £4 13s. 6d.
41. £1
42. 10 guineas
43. £3 9s. 4d.
44. 430 envelopes
45. 36 miles per hour

THE PRACTICAL TEACHER AND THE 'MIGHTY ATOM.'

OPEN LETTER TO MARIE CORELLI.

DEAR MADAM,—It has seemed good in your eyes, O gifted authoress, to traduce in your 'Mighty Atom' all who profess and call themselves Progressivists, or in simpler and more familiar parlance, Progressives. Holding up successively to our astonished gaze a pedantic and agnostic cynic, an adulterous wife and a child suicide, to say nothing of the learned Professor who plays the part of repentant villain in the piece, you shriek out, 'These be your gods, O Israel!' and 'Behold the works of your hands!' and you have expected, without doubt, rapturous plaudits on the one hand, and crestfallen hiding of diminished heads on the other.

Truly hath it been said, O gifted lady, that a little knowlege is a dangerous thing, for, of a certainty, your philippic smacks of ignorance of your subject from dedication to peroration. Had you but spent as much time in studying the working of an average Board School as you gave down in beautiful Devonshire to the study of 'one James Norman,' never would you have perpetuated so libellous a production as I hope to show your 'Mighty Atom' undoubtedly is. Surely there is 'gall enough in thy ink,' and just as certainly hast thou written with a 'goose pen.'

Lest there should be any doubt as to the gall, I will reproduce your Dedication.

TO
THOSE SELF-STYLED PROGRESSIVISTS,
WHO BY PRECEPT AND EXAMPLE
ASSIST
THE INFAMOUS CAUSE
OF
EDUCATION WITHOUT RELIGION;
AND WHO BY PROMOTING THE IDEA BORROWED FROM
FRENCH ATHEISM, OF DENYING TO THE
CHILDREN IN BOARD SCHOOLS
AND ELSEWHERE
THE KNOWLEDGE AND LOVE OF GOD
AS THE TRUE-FOUNDATION OF NOBLE LIVING,
ARE GUILTY
OF A WORSE CRIME THAN MURDER.

From this and from what follows in page 340 of your work, it is evident that you fondly imagine—

(1) That Progressives aid, abet, and practice mental over-pressure and cram.

(2) That they desire to exclude religious teaching from Board Schools; and

(3) That the 'sound body' is to be left to chance, to the end that the child may become a veritable tadpole, all head and no body.

Now a mere superficial attention to the sayings and doings of the 'self-styled Progressivists,' would disprove each and every of your indictments.

Have you ever, dear lady, in the course of your preparation for the office of educational expert, happed upon a work by 'one Herbert Spencer,' on Education. If so, and remembering that this same Spencer is one of the acknowledged high priests of Progressivism, pray turn to pp. 167-170, and then see whether you, with all your powers of invective, can more effectually cry anathema on cramming and all its works, than is done by this 'self-styled Progressivist.' Take this sentence for example, which is endorsed by the rank and file of Progressives, and then ask yourself if this cult against which you have so blindly tilted could possibly perpetrate such a monstrosity as your Lionel Valliscourt admittedly is: 'Those who, in eagerness to cultivate their pupils' minds, are reckless of their bodies, do not remember that success in the world depends more on energy than on information; and that a policy which in cramming with information undermines energy, is self-defeating. The strong will and untiring activity due to abundant animal vigour, go far to compensate even great defects of education; and when joined with that quite adequate education which may be obtained without sacrificing health, they ensure an easy victory over competitors, enfeebled by excessive study; prodigies of learning though they be.' This, Madam, is but one amongst thousands of denunciations, dating from times long anterior to your birth, making known to all and sundry that Progressives uncompromisingly renounce the devil cram and all his works. Furthermore, should you desire in the course of your efforts to specialise as an educationist, and feel the want of a text book against over-pressure, procure I pray you the little book which Mr. Sydney Buxton, another of the 'self-styled,' eleven years ago, launched against the then rampant evil. In fine, dearest lady, when you were quite unknown to fame, and had not presumably commenced your educational apprenticeship, cram and over-pressure were the quarry of the Progressivists, to whom should be ascribed the honour of reducing the evil to the diminished form in which to-day it exists amongst us.

And now, Madam, let us examine the Religious Question. Do Progressivists aim at education without religion? or do they simply refuse to hand over the Board School to become the cock-pit of the denominators? That preparatory study of the question, without which it were the grossest of impertinence to issue such a book as the 'Mighty Atom,' should have enabled you to answer the question. What was desired, and what has been gained, is the maintenance of the 'compromise,' under which a child, like your Lionel, would have received instruction in a London Board School, according to the following syllabus:—

Memory Work.—St. John xiv., verses 15-31; or 1st Epistle St. John, chap. iii., verses 11-20; Ephesians vi., verses 1-18; or Corinthians xii. 31, and chap. xiii., and also any of the following Psalms cxliv. to cl.

Learn the following proverbs to illustrate the duty of truthfulness—Proberbs xii., verses 17, 18, 19, 22; xiv., verse 25; xvi., verse 24; xix., verse 22; xxvi., verse 28, and xxviii., verse 13.

Learn Isaiah lv.

Lessons from Isaiah, chaps. lii. to lxvi. Simple lessons from the Gospel according to St. Matthew.

How far this is removed from the state of affairs depicted by you, let common sense and veracity judge.

At the head of the official declaration of Progressivist opinion on the religious question is placed the following declaration of Sir Joshua Fitch, when Chief Inspector to the Education Department, himself an admitted Progressive.

'Probably the last thing the skilled teacher would care to discuss with a young child would be the difference between Church and Dissent, or between the tenets of a Baptist and those of a Unitarian. These differences, no doubt, become serious and significant as life advances, and as opinions are formed, but they have little or no meaning to a young child, and are wholly out of place in a scheme of primary instruction.'

This, dear madam, is the Progressive faith as to what should not be done, and as to what should be done, in the matter of religious instruction; and having learnt this, do you, as an honest woman, hasten either to stop the circulation of your misleading book, or at least to issue with each volume a confession of your ignorance as to what really constitutes Progressivism in education.

Your Lionel, poor little fellow, was a tadpole, and you would hold us up to contumely as active participants and abettors in the ignoble production of such monstrosities. Fie upon you, Miss Corelli! For misinterpretation much less odious, have you not sought such legal remedy as the laws of your country afford? And being sensitive of your own reputation, should you not take reasonable care to avoid besmirching that of your fellows, be they but self-styled Progressivists? For it is notorious that Progressivists would spend much money in making schools healthy and beautiful. They would send children out into the fields in order to 'look up through Nature to Nature's God.' It is they who would have time and money spent upon the production of the sound body which your Lionel so sadly lacked; nay, it is even they who would go so far as to feed the hungry, as well as to exercise them into soundness and comeliness when fed. All these things are writ large in the sayings and doings of the 'self-styled,' and yet you are blind to the fact. Such ignorance, if not wilful, is at least culpable, and certainly unworthy of the reputation of a leading novelist, as you will, it is hoped, upon reflection admit.

As a minor point I would impress upon your notice the fact that there is no Infants' Department in England wherein fairy lore is not honoured in the observance, not only by repetition, but also by actual representation in the shape of cantatas and children's plays. Indeed, a glance at the list of Children's Operettas issued by Messrs. Curwen and Sons will sufficiently demonstrate how popular are fairy tales, and how widely they are utilised by discriminating school teachers, be they 'Progressivist' or otherwise.

Progressives take no responsibility for the declarations of Mr. Holman in this connection; their sympathies would be entirely with you and the fairies.

Is it that you have been misled by the blatant inanities of the Anti-Progressives who say what is not, because of the distastefulness to them of what is? To lend your name and fame to a crusade against Progressivism should surely demand personal and searching inquiry into the cult, which I venture, dear madam, to affirm has not been given by you.

To show the injustice of this, I will, in conclusion, put a case. Suppose I were to say that you, Miss Corelli, have not the merest smattering of Latin, because in the 63rd thousand of your 'Mighty Atom' you permit such a conspicuous misquotation and grammatical blunder as '*Vanitas vanitatEm*' to remain. Would you not complain, and justly so, that I was condemning your Latinity on very slender grounds? Surely, yes. So do I, for my part, protest that you condemn Progressivism upon the flimsiest pretext, being utterly ignorant of the true meaning and aim of the movement which commends itself to all sorts and conditions of Her Majesty's lieges, and which will, we trust, ultimately number amongst its disciples and professors the talented author of 'The Sorrows of Satan,' and 'Barabbas.'

I am, dear Madam,
Sorrowfully yours,
A PROGRESSIVE PRACTICAL TEACHER.

We have the pleasure to inform our Readers that we hope to be able to insert in our next number an article on the subject of 'Singing,' from the pen of Dr. W. G. McNaught.

QUERY COLUMN.

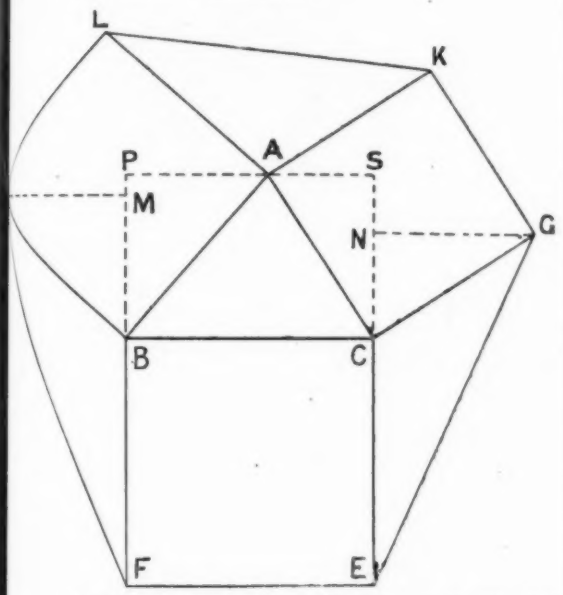
RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the *coupon* which appears on the back wrapper of the current number of the Journal.
3. Correspondents will oblige by stating, whenever possible, the source from which their query has been obtained.

The Editor of the PRACTICAL TEACHER reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

F. Dainteth (*Warrington*).—If squares be described on the sides of *any* triangle, the lines joining the adjacent corners is equal to three times the sum of the squares on the sides of the triangle.—Deighton, Pts. I., II., p. 127, No. 15.

1. *If triangle be acute-angled*—



Let ABC be given acute-angled triangle. On the sides draw respectively the squares AD, BE, CK. Join FD, EG, KL.

Then $FD^2 + EG^2 + KL^2 = 3(AB^2 + BC^2 + CA^2)$.

Since all the angles made by the lines which meet at the point C together = 4 right angles, and the angles ACG and BCE are each right angles and ACB is an acute angle, ∴ ECG is an obtuse angle. Similarly it may be proved that each of the angles KAL, DBF is an obtuse angle.

Let GN, DM be the perpendiculars respectively dropped from G and D on EC and FB produced. Through A draw PAS parallel to BC to meet FB and EC produced respectively at P and S. Then PBCS is a rectangle.

Because angles ACS + SCG = one right angle, and angles ACS + CAS = one right angle, then SCG or NCG = CAS. And since ASC and GNC are each right angles, ∴ remaining angle NGC = remaining angle SCA. Thus the two triangles ASC and NGC are equiangular, and one side AC = one side CG since they are both sides of a square. ∴ the triangles are equal in all respects (I. 8), and NC = SA. Similarly MB may be proved = PA.

$$\therefore NC + MB = SA + AP = SP = BC.$$

By Euc. II. 12—

$$EG^2 = CE^2 + CG^2 + 2CE.CN$$
$$= BC^2 + AC^2 + 2BC.CN.$$

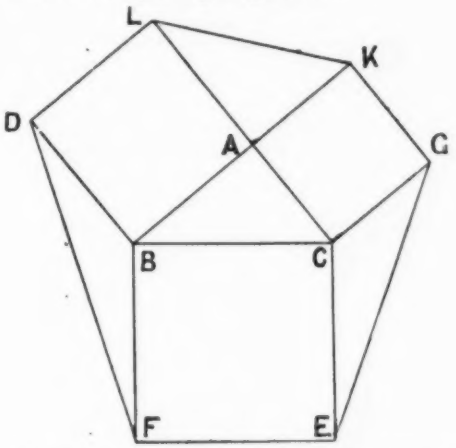
Also $DF^2 = BF^2 + BD^2 + 2FB.BM$
$= BC^2 + AB^2 + 2BC.BM;$
$\therefore EG^2 + DF^2$
$= BC^2 + AC^2 + 2BC.CN + BC^2 + AB^2 + 2BC.BM$
$= 2BC^2 + AC^2 + AB^2 + 2BC.(CN + BM)$
$= 2BC^2 + AC^2 + AB^2 + 2BC.BC$
$= 4BC^2 + AC^2 + AB^2.$

Similarly $GE^2 + LK^2$ may be proved
$= 4AC^2 + AB^2 + BC^2,$
and $LK^2 + DF^2$ may be proved
$= 4AB^2 + AC^2 + BC^2.$

Then $EG^2 + DF^2 = 4BC^2 + AC^2 + AB^2,$
$GE^2 + LK^2 = 4AC^2 + AB^2 + BC^2,$
$LK^2 + DF^2 = 4AB^2 + AC^2 + BC^2.$

Adding these results,
$2(EG^2 + DF^2 + LK^2) = 6(AB^2 + BC^2 + AC^2),$
$\therefore EG^2 + DF^2 + LK^2 = 3(AB^2 + BC^2 + AC^2).$

2. *Let the triangle be right-angled at* A—



As before, it can be shown that the angles GCE and DBF are obtuse, and it can easily be proved that the angle LAK is a right angle.

According to the proof in the first case—

$$EG^2 + DF^2 = 4BC^2 + AC^2 + AB^2.$$

By I. 47,

$$LK^2 = LA + AK^2$$
$$= AB^2 + AC^2.$$

$$\therefore EG^2 + DF^2 + LK^2 = 4BC^2 + 2AB^2 + 2AC^2$$
$$= 3BC^2 + BC^2 + 2AB^2 + 2AC^2.$$

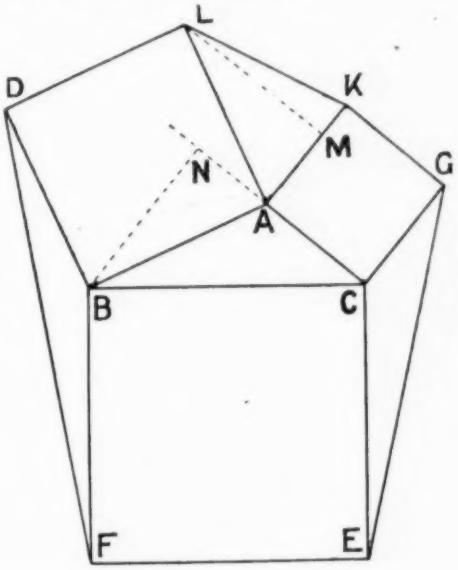
But by I. 47,

$$BC^2 = AB^2 + AC^2.$$

Substituting this value on the right hand side of the equation above,

$$EG^2 + DF^2 + LK^2 = 3(AB^2 + AC^2 + BC^2).$$

3. *If the triangle is obtuse-angled at* A—



Each of the angles ACB and CBA is acute angled. As before, it can be proved that the angles GCE and DBF are each obtuse angles. By a similar method of proof, the angle LAK can be shown to be an acute angle.

From L drop the perpendicular LM on AK. Produce CA to N to meet the perpendicular BN dropped on it from B. Then KAN may be proved equal to a right angle.

Since the angles LAN + NAB = the right angle LAB, and the angles MAL + LAN together make up the right angle KAN,

$$\therefore \text{LAN} + \text{NAB} = \text{LAN} + \text{MAL};$$
$$\therefore \text{ang. NAB} = \text{ang. MAL}.$$

And in the triangles in which these are respectively situate, the right angles at N and M are equal. ∴ the remaining angle ABN = remaining angle MLA, and the side LA = side AB. ∴ the triangles are equal in every respect, and AN = AM (I. 8).

As in the first and second cases,

$$EG^2 + DF^2 = 4BC^2 + AC^2 + AB^2.$$

By Euc. II. 13,

$$LK^2 = LA^2 + AK^2 - 2KA.AM.$$

Since KA = AC, LA = AB, and AM = AN,

$$\therefore LK^2 = AB^2 + AC^2 - 2AC.AN;$$
$$\therefore EG^2 + DF^2 + LK^2$$
$$= 4BC^2 + 2AB^2 + 2AC^2 - 2AC.AN$$
$$= 3BC^2 + BC^2 + 2AB^2 + 2AC^2 - 2AC.AN.$$

By Euc. II. 12,

$$BC^2 = AB^2 + AC^2 + 2AC.AN.$$

Substitute this value for BC^2 in the right hand side of the equation above,

Then $EG^2 + DF^2 + LK^2$
$$= 3BC^2 + (AB^2 + AC^2 + 2AC.AN) + 2AB^2 + 2AC^2 - 2AC.AN$$
$$= 3(AC^2 + AB^2 + BC^2).$$

OUR LATE FRENCH PRIZE EDITOR.

THE sudden death of our French Prize Editor, Mr. Jacques Jérémie Beuzemaker, B.A. and B. Mus. of the London University, deprives us of one of our most valuable contributors. No one was so pre-eminently fitted for the post of French Prize Editor as Mr. Beuzemaker. With a vast knowledge of French literature he combined a most extensive acquaintance with the English classics, while his exceptional qualities as a teacher enabled him to warn against mistakes any one else would have passed by in silence.

Mr. Beuzemaker was born at Leyden (Holland) on the 3rd of May 1847. He was first educated at the French school in connection with the French Protestant Church of that town, and then entered the training college for teachers at Haarlem at the age of 16. After obtaining his certificate he settled in England, where he has been ever since, except a couple of years which were spent in the South of France. On obtaining the B.A. degree of the London University he removed to London, and soon after took the Mus. Bac. degree of the same University.

About the same time he became examiner in French to the College of Preceptors, where he won the admiration of all who came into contact with him as an examiner.

Shortly after he was appointed Editor of the *French and German Journal*, which was subsequently carried on as the *Modern Language Monthly*. Great were the pains he bestowed upon the paper; every effort was made to put it on a sound basis, and his scholarship soon gained him a well-deserved admiration. But the public as a body remained apathetic; the voice of one who promised a perfect knowledge of French Conversation in six months, at 'a penny a week,' proved too attractive; and though many afterwards repented of having listened to that deceptive voice, and returned to the wiser counsel of the journal, it was found impossible to continue with the comparatively few real scholars that remained.

But the journal brought Mr. Beuzemaker many friends, and the many thorough students who found the needed help will feel that a true teacher has left them. Soon after the journal had ceased to exist Mr. Beuzemaker became the general editor of Messrs. Blackie & Sons' 'Modern Language' series, contributing himself the First French Course, which has already been a marvellous success, and also the Second French Course, which is in the press, while the Elementary French Course is left unfinished. His French Reader in the same series may well be regarded as an example of how a French Reader should be edited.

THE LATE MR. J. J. BEUZEMAKER, B.A., Mus.Bac.

The Modern Language Association, too, of which he was the founder and chairman, will feel his loss for many years to come. With a painstaking assiduity that has fully earned the gratitude of every Modern Language master, he combined the best teachers in the kingdom into one body, and by his geniality encouraged them to work together for the common weal.

His fine scholarship, too, has found the most unbounded admiration among the members of the Philological Society, who have admitted with one accord that the Science of Phonetics has lost in Mr. Beuzemaker a devoted student who has considerably advanced the almost untrodden path of French Phonetics.

The fact that such a scholar has suddenly passed away from us, himself entirely unconscious of the approaching hand of death, gives a painful accuracy to the saying—

'Ars longa, vita brevis.'

An Important Paper on

'RUSSIAN PRIMARY SCHOOLS,'

by Stewart A. Robertson, M.A., English Master, Stirling High School, will appear in an early number of the 'Practical Teacher.'

OUR FRENCH PRIZE COMPETITION.

PRIZE AWARD—SEPTEMBER.

The Prize is awarded to *Erica Tetralix*, the pseudonym of A. MACDONALD, Durris Public School, by Aberdeen, N.B.

First Class.—White Heather, Jeunesse, Syd, Beckenham, Petronilla, Pedagogue, Claviger, France, Olivia.

Second Class.—Nincompoop, Sesame, Kettering, Camillus, Teesdale, Gabrielle, Maid Marian, L'École Normale, Amica, Swanage, Pro Virile Parte, Jim, Veritas, Anglaise, Iserne, Eurydice, Jena, Fors Clavigera, Nortoniensis, B.

Third Class.—St. Omer, Karlonri, Vincent, Persean, Rose, Fainéant, Belinda, J. H., Integer, Verus, Omega, Dum Spiro Spero, Vigilabo, Rupert, Ignoramus, Cicero, Bilbao, Johnny, Festina Lente, Disgrace, Hope, Grey Hope, St. John, Filumena, Heatherbell, Crux, Pyro.

Fourth Class.—Mercia, Stundish, Spes, Jessica, Dunelm.

Ruskin est l'ennemi né de toute concession. Il parle sans aucune considération des goûts de ceux qui l'écoutent. Le suive qui peut ! Au public de voir s'il veut s'instruire en pénétrant le sens parfois caché de ses paraboles. Il fait comme la nature qui ne met pas à nu son or, 'le type physique de la sagesse, mais le dissimule dans les entrailles de la terre.' Si les mineurs manquent à ces placers, ce sera pour une autre génération !

'Je m'addresse,' dit-il, 'aux laboureurs de l'Angleterre, mais non de l'Angleterre de 1870–73. Les temps viendront. . . . .' En attendant qu'ils viennent, le maître parle en pleine foule avec la liberté d'un prêcheur de désert. Il écrit comme le saint Mathieu de Rembrandt, qu'on voit au Louvre. Il semble uniquement préoccupé de ce qu'un ange chuchote, là, derrière lui, à son oreille. . . . . .

Comment la foule a-t-elle pris le chemin de ce désert ? Pourquoi s'est-elle rassemblée devant l'écrivain qui, pas plus que le vieil évangéliste de Rembrandt, n'a marché vers elle ? Pour le savoir, écoutons ses paroles. Ecoutons-les toutes, sans distinction : paroles de la vingtième année et paroles de la soixante-seizième année, paroles destinées à prouver, paroles destinées à dépeindre, paroles destinées à émouvoir, paroles de l'écrivain, paroles du conférencier et paroles du guide, c'est-à-dire paroles qui viennent vous trouver au coin du feu d'hiver, alternant avec les crépitements des branches dans l'âtre, paroles qui furent prononcées dans une assemblée vibrante aux impressions réflexes sur l'orateur, ou paroles que vous lirez seulement devant les monuments lointains, sur les marches des campaniles ou sur les rampes des montagnes—paroles qui instruisent, paroles qui évoquent, paroles qui entraînent, ou au contraire vous arrêtent et vous retiennent immobiles sous une voûte cachant une immensité ou sur une tombe cachant un néant.

ROBERT DE LA SIZERANNE.

Translation by *Erica Tetralix.*

Ruskin is the born foe to all compromise. He speaks without any consideration for the predilections of those who hear him : follow him who may ! It is for the public to find out whether they will be instructed by discovering the meaning occasionally hid away in his parables.

He acts like Nature, who does not lay bare her gold—the physical symbol of wisdom—but hides it in the bowels of the earth. If there are no miners at these placers, those treasures will be for another generation.

'I address myself,' says he, 'to the labourers of England, but not the England of 1870–73. The time will come. . . .'

In the meantime, till it come, the master speaks to the multitude with the outspokenness of a preacher in the wilderness. He writes like Rembrandt's St. Matthew, whom you see at the Louvre.

He seems wholly preoccupied with that which an angel behind him there whispers into his ear. How has the multitude taken the road to this desert ? Why has it collected before the writer who will no more than the old Evangelist of Rembrandt draw near to it.

In order to understand this, hear those words : hear them all without distinction—words of his twentieth, and words of his seventy-sixth year—words calculated to approve, to depict, to move —words of the writer, of the lecturer, of the guide ; that is to say, words that recur to you by the winter fire, alternating with the crackling of the branches on the hearth—words that were spoken in the midst of an assembly throbbing with feelings responsive to the speaker, or words which you read only on far distant monuments, on the stairs of *campanili*, or on the mountain sides —words that instruct : words that draw you out of yourself : words that carry you quite away, or, on the contrary, that arrest you and hold you motionless under a vault covering immensity, or upon a tomb concealing emptiness.

ERICA TETRALIX.

The extract was evidently a severe test, not only in point of style, but also as regards the vocabulary. In fact the pitfalls were so many, that it was necessary to create a fourth class to distinguish the fair from the bad. A competitor who begins with 'Ruskin is a born enemy. Everybody admits that,' as a rendering for : *Ruskin est l'ennemi né de toute concession*, and continues in a similar strain, cannot possibly be entered even as a bad third class, though it is not always the beginner that indulges in paraphrasing. An excellent translation was marred by the following rendering : 'Ruskin has an innate dislike to making allowance for anything.'

The sentence : *Au public de voir, etc.*, relegated many translations to the third class.

'For the public to see if, etc.' is not English, and 'to the public' is altogether beside the mark. Even the prize-winner's version is faulty. *Voir* means here, 'to decide,' and *le sens parfois caché de ses paraboles* is simply, 'the sometimes hidden meaning of his parables.'

The rendering : 'He borrows a leaf from the book of Nature,' for *Il fait comme la nature* is too free.

Le type physique de la sagesse can only refer to the word *or*, and not to *la nature*.

'Placers' is a good word to render the French *placers*, which are deposits of valuable mineral. Gold, tin ore, and precious stones are always found in placers.

Ce sera pour une autre génération should have been rendered by, 'It will be for another generation to work them.' *Ce* cannot possibly refer to 'placers,' as the prize-winner and the majority of the other competitors have done.

Laboureurs usually means 'husbandmen,' and is here particularly well chosen in reference to the preceding *mineurs*, but in the English rendering, 'working-men' would be preferable. 'Workmen' is out of the question.

En pleine foule is not 'to the full crowd,' nor will 'unreservedly' do.

Qu'on voit au Louvre is not 'which is now on view at the Louvre.' The Louvre is as much a permanent collection as the National Gallery.

Comment is 'how ?' and not 'why ?'

The prize-winner's rendering of *vers elle* is hardly elegant enough, and almost ambiguous. 'To meet it,' is much better.

Prouver is 'to convince,' not 'to approve.'

Conférencier is simply 'lecturer.'

The sentence *qui viennent vous trouver . . . dans l'âtre* proved a great stumbling-block.

'Commingling' seems by far the best word for *alternant*. *Crépitements* was generally rightly rendered by 'crackling,' though, as many competitors pointed out, *crépitations* is the more usual word. *Crépitements* is so natural a formation from *crépiter*, that it merely requires the stamp of genius to make it current coin.

Vibrante aux impressions réflexes sur l'orateur was the *pièce de résistance* of the extract, and the prize-winner was the only one who gave a good rendering of the phrase.

Vous lirez is here 'you will be likely to interpret,' not 'read.' In the sense of 'interpret,' the word is of common use in France.

Campaniles are 'bell-towers,' or 'steeples.'

Entraîner, too, was commonly mistranslated. 'To entrance' will not do, because it spoils the remainder of the sentence entirely.

Not a single contributor had brought out the beauty of the antithesis *une immensité* and *un néant*. Even the best gave a rendering corresponding to *l'immensité* and *le néant*. The author evidently means that the words 'hold you spell-bound under a vault concealing a long vista, or on a tomb concealing a chimera.'

And finally, one more word of warning to those English scholars who will persist in rendering too freely. It was pointed out to 'White Heather' in the July Prize Award that his English was good, but far too free. This time again his version is in excellent English, but much too free. It is a great pity that such good work should be spoilt in this way.

THE Lords of the Committee of Council on Education have appointed Mr. A. J. R. Trendell, C.M.G., to be Assistant Secretary of the Department of Science and Art in succession to Mr. G. F. Duncombe, retired. Mr. Edward Belshaw succeeds Mr. Trendell as the Chief Clerk.

OCTOBER PRIZE COMPETITION.

Prize Editor.—W. T. THOMPSON, B.A., LOND.,
First Class French Honours.

A Prize of One Guinea will be given for the best translation into English of the following extract :—

La dispute des idéalistes et des réalistes n'est pas nouvelle. Je ne ferai à ces derniers qu'une objection. 'Si vous ne me présentez que ce qui est, sous les rayonnements de l'art et les reflets de l'infini, comme Rembrandt, ce grand amoureux de la Vérité et non du Réel, pourquoi voulez-vous que je vous lise? Tout est un spectacle, sans doute, mais j'aime mieux voir ce spectacle sur le théâtre de la vie que dans vos ouvrages. Qui m'assure qu'à votre insu vous n'avez point altéré les traits de vos modèles? Je ne me sens aucune inclination à devenir amoureux sur la foi d'un photographe. Vous aurez beau m'affirmer que la lumière et l'ombre ont joué d'elles-mêmes, que votre héroïne s'est fixée comme dans un miroir, je vous croirai et j'admirerai volontiers votre adresse ; mais si, par aventure, votre beauté est belle, je vous demanderai à voir la femme.'

En face d'un point de vue si limité je me demande si je ne préférerais pas l'exagération contraire. Des philosophes ont prétendu que l'homme seul existait, et que la nature était un rêve et une illusion. Sans aller jusque-là, on peut bien soutenir que chacun de nous décompose le monde extérieur avec l'ensemble de ses facultés et de ses sentiments. Pour le chasseur, l'oiseau est une proie ; pour le savant, c'est un squelette ; pour le laboureur, c'est un ennemi qui mange le grain ; pour le poète, c'est un chanteur ailé ; pour l'amoureux, c'est un souvenir harmonieux. Le paysage chante avec le paysagiste. Tous les tableaux visibles sont des souvenirs d'idées qui mûrissent dans la tête ou dans le cœur de l'homme. Décrire pour décrire, à quoi bon? Les images ne sont pas des ressemblances ; elles ont passé par la lanterne magique de notre souvenir ; elles se sont transformées au contact de nos sentiments les plus intimes. La campagne que je vois seul n'est plus celle que je vois à deux. Le coucher du soleil que je contemple avec un sentiment d'espérance dans l'âme ne ressemble point à celui que je regarde un jour de désenchantement. Dans le premier cas, ce soleil me dit : *Au revoir!* Dans le second, il m'a dit : *Adieu!*

ARSÈNE HOUSSAYE.

RULES.

1. All translations should be posted not later than October 10, and addressed :—*Prize Editor*, Office of THE PRACTICAL TEACHER, 33, Paternoster Row, London, E.C.
2. Competitors should cut out, and send the Coupon which appears on the Back Wrapper page of the current number.
3. Competitors should adopt a pseudonym, and send name and address written on a separate piece of paper.
4. Teachers employed exclusively in teaching modern languages are not eligible as prize-winners.

PHOTOGRAPHIC COMPETITION.

All the prints received in this Competition have been submitted to a Fellow of the Royal Photographic Society, who awards the Prizes as follows :—

First Prize.—**A Three-Guinea Camera,** to Mr. ROBERT A. CAMPBELL.

Second Prize.—**Apparatus to the value of One Guinea,** to Mr. H. RENDELL.

Third Prize.—**Books to the value of 10s. 6d.,** to Mr. A. DAVIES.

Fourth Prize.—**Books to the value of 5s. 6d.,** to Mr. J. KEARNEY.

Fifth Prize.—**Books to the value of 5s.,** to Mr. H. ELLWOOD.

BEST TEN SETS, IN ORDER OF MERIT.

1. Robert A. Campbell, Wesleyan School, Ventnor, Isle of Wight :—
   * The Stepping Stones, Jesmond Dene, Newcastle.
   * Carisorooke Castle, the Entrance.
   * Carisbrooke Castle, the King's Rooms, etc.
2. H. Rendell, Bishopsnympton, South Molton, Devon :—
   * 'Enjoying the Ride.'
   * Old Mill, Dulverton.
   New Quay Harbour, Cornwall.
3. A. Davies, Cove and Hawley Board School, Farnborough :—
   * 'Dolly's Tea Party.'
   * Shoeing a Horse.'
   'A Painless Operation.'
4. J. Kearney, 43, Sandy Road, Seaforth :—
   * Douglas Harbour.
   The Dee at Chester.
   'A Moment's Rest.'
5. Horatio Ellwood, Highcliffe School, Christchurch, Hants:—
   * School Buildings, Hinton Admiral.
   Priory Church, Christchurch.
   The Shelley Monument.
6. John Toy Morshead, School House, Troon :—
   * Kynance Cove.
   St. Michael's Mount, Penzance.
   Deer Stalking.
7. W. G. Folkarde, M.A., Riverlea, Aberfeldy, N.B. :—
   Tantallon Castle.
   Oxford Street, London.
   Steamship 'Pladda.'
8. Edward Lumley, 124, Holly Park Road, New Southgate, N. :—
   * Stonemason at Work.
   Blacksmith's Shop.
   Hoar Frost.
9. Pryce Jones, Carbrook Junior Board School, Sheffield :—
   Barge on River Don.
   Yacht at Aberystwyth.
   View of Aberystwyth.
10. Albert E. Malburn, Wesleyan Schools, Hazlegrove, Stockport :—
   Albert Memorial, Belfast.
   Coaling Vessels, Douglas.
   The Washing Floors, Laxey.

* Specially Commended.

Two Competitors put themselves out of running by the non-observance of the condition to send *duplicate* prints. One of these, Mr. Jas. Howard Harris, of Helston, by carelessness in trimming and mounting, just failed to obtain the highest marks for any single photograph ; his 'Waterfall in Glen Meay' is an admirable study.

Note.—The Editor will be glad to meet the wishes of the Prize-winners as to the apparatus and books preferred.

THE NEW PRESIDENT OF THE EDUCATIONAL INSTITUTE OF SCOTLAND.

JOHN ADAMS, Esq., M.A., B.Sc., F.C.P.
Rector, Free Church Training College, Aberdeen.

THE recent elevation of Mr. Adams to the Presidentship of the Educational Institute of Scotland by an overwhelming majority of votes is the last step in the somewhat extraordinary career of one who, at a comparatively early age, has fought his way to the highest honour within the grasp of a Scottish teacher, and one usually reserved for venerable scholars and educationists. He is probably the youngest of the whole line of Presidents, and owes the exceptional distinction to the election being based, for the first time, on universal suffrage. The educational instinct of the great body of Teachers in Scotland, putting aside all traditional considerations and practices, led directly to the choice of one of the most able, scholarly, and energetic teachers and educationists North of the Tweed.

Mr. Adams is still on the sunny side of forty, having been born in Glasgow in the year 1857. He served a four years' apprenticeship in Oatlands Public School, where he gave early indications of the grasp and determination that have marked and moulded his whole subsequent career. He entered the Normal in 1876 as Fourth in Scotland, and gained the First place there at the end of each year of training. He had in addition six First Class Certificates under the Science and Art Department. The Rector referred to him as 'one of the most accomplished students we have ever had,' and adds 'his acquaintance with the history and philosophy of teaching is wider than that of any young man within the range of my knowledge.' The Master of Method certified that 'he per-

formed the work prescribed with an intellectual ability completely distancing all others.'

Simultaneously with his work as Assistant Master, he had a full course in both Arts and Science (including laboratory

J. ADAMS, Esq., M.A., B.Sc.,
President of the Educational Institute of Scotland.

work) at Glasgow University, where he gained high distinction in the Literary and Philosophical, as well as in the Mathematical and Scientific Classes, ending his course by taking the degree of M.A. with First-Class Honours in Philosophy, and also of Bachelor of Science. The late Professor Nichol writes of him :—'He was indeed *facile princeps;* and, during a period of twenty-three years, I have never had in my class a more accomplished scholar.'

Although thus fully equipped by a complete course of study —literary, philosophical, and scientific—he was desirous of still further widening his range in the direction of philological and purely literary subjects, and in pursuance of this object devoted a session at Leipsic to the study of old German and French. Similarly, on the scientific side, he had a Summer Laboratory Course at South Kensington, and gained a First Class in biology. Finally, in a further attempt to gain the Fellowship of the College of Preceptors (a rare distinction in Scotland), he was successful, and won the £10 prize for the best set of papers in the Theory and Practice of Education.

The cup of his distinction was now about full for the present, and he settled down to the practical side of his profession as Lecturer on English, and Master of the Senior Department in Aberdeen Free Church Training College. His success as a teacher was no less pronounced than as a scholar. H.M. Inspector reports that 'the instruction in the different classes was permeated by a life and an intelligence which I have seldom, if ever, met with in any school, and which I have certainly never seen surpassed.'

A desire to vary his experience by having full charge of one of the large modern Board Schools led to his becoming a candidate for the Head Mastership of the new Public School, Jean Street, Port Glasgow, to which he was appointed. His phenomenal success there led to his appointment, after two and a half years, to the Rectorship of Campbelton Grammar School, where his enthusiasm and energy quickly raised it to the front rank of Secondary Schools in the West of Scotland. At the end of two years the Rectorship of Aberdeen Free Church Training College became vacant through the death of Mr. Ramage, and the reward and goal of his work and ambition seemed near and open. In the face of his splendid training and unrivalled qualifications for such an office all competition seemed to melt away, and he was unanimously appointed Rector in 1890. Thus, in a few years, through sheer industry and ability, he has passed rapidly through all the stages of Assistant, Senior Master, Head Master, and Rector (Grammar School), to the Rectorship of a Training College, beyond which there is no land visible—unless one should think, in a half-credulous, half-presumptuous way, of a Professorship or of the Inspectorate. Whether a Rectorship or Inspectorship carries the greater dignity is still a moot point in Scotland; which carries the more money is, we believe, settled.

Although one of the busiest of men professionally, Mr. Adams has made use of his pen in large measure and to excellent purpose. Since his college course was ended he has almost constantly contributed to educational literature. Perhaps the greatest evidence of the variety and range of his information is to be found in the review columns of the daily press, where all sorts and conditions of books have been treated as befitted them. As an aid to normal students he published twelve articles in the PRACTICAL TEACHER on *Mental Science as Applied to Education* (1886); a clear, trenchant, and lively exhibition of a somewhat dull subject, which deserved an issue in book form. A very amusing and sagacious series of *Papers for Pupil Teachers* appeared in the PRACTICAL TEACHER in 1894. Sketches and articles of the raciest character from his pen have enlivened the columns of the *Educational News*. He is a contributor to the *Critical Review*, *The Cornhill*, *Ludgate*, *Youth*, *Boy's Own Paper*, *U. P. Magazine*, and many others, where his 'gay wisdom' and lively sketches are in constant and eager demand. His more recent incursions in the domain of fiction for boys and girls have been frequent and altogether successful. The perusal of *Hammond's Hard Lines* must have given sore anxiety and amusement to many a boy; and *The Rickerton Medal*, a newly issued tale of Glasgow schoolboy life, shows a fine knowledge of boy nature in its strength and weakness; while *Fifteen Stamps* proceeds on such amusing and supposed questionable lines that it was banned or blessed by the puzzled critics according to their lights. It is satisfactory to know that the lighter and more remunerative lines of fiction have not withdrawn his attention from the weightier and more erudite studies of an educational character, such as the Herbartian Psychology in its relation to education which he has lately expounded in a series of lectures, and which he is so well fitted to enliven and popularize, as far as that feat is possible and desirable. His gift and mission seem to us to lie in the line of dealing with educational subjects and studies, in themselves dull or abstruse, in such a way as to render them not only intelligible but attractive, by the infusion of humour, insight, and fresh presentation.

As models of these qualities we may note his lectures on *The Duffer; Fagin, or, Teaching by Example; Sherlock Holmes, a Lesson in Observation;* and others of the same kind, in which he has no rival. A series of lectures also on *Sabbath School Teaching* which he delivered in Aberdeen, showed the same freshness of treatment, and attracted large audiences, many of whom had no connection with Sunday classes, but found enjoyment and refreshing in the exercise of hearing.

Mr. Adams' studies in the Continental languages, notably French and German, have been so frequently supplemented by summer trips to the Continent, that he now speaks these languages with all the fluency of a native, and has, through frequent residence in purely country districts, mastered the dialects of these as well. His familiarity with these may be inferred from the fact, that although occasionally apprehended and temporarily confined on suspicion of being a questionable character, he has never been taken for an Englishman.

A New and Original Two-Part School Song, in both Notations, will appear in the next number of the 'Practical Teacher.'

THE EDUCATIONAL INSTITUTE OF SCOTLAND.

THE ANNUAL GENERAL MEETING.

THE fiftieth Annual General Meeting of the Educational Institute of Scotland was held on Saturday, the 19th September, in the large

MR. LAURENCE,
The New Secretary of the E.I.S.

hall of the Royal High School, Edinburgh. There was a very large attendance of delegates and of the general body of teachers from all parts of the country, and the remark was frequently heard that a larger place of meeting would ere long be required. A special feature of this meeting was the care with which ordinary members were excluded from the seats set apart for delegates, who were admitted by ticket. There was a little grumbling on the part of some who, through absence on holiday or other cause, were unable to show their ticket of admission; but, under the genial treatment of Mr. Martin and Mr. Lindsay, who had been entrusted with the arrangements, all were ultimately admitted who had the right, and when Mr. John Dunlop, of Borgue Academy, the retiring President, took the chair at eleven o'clock, the hall was packed in every part, even the galleries being fully occupied.

PRESENTATION TO DR. SMITH, THE RETIRING GENERAL SECRETARY.

After the minutes of last General Meeting had been adopted, the President, in name of the members of the Institute in all parts of Scotland, presented Dr. Smith, the retiring Secretary, with a magnificent silver tray bearing a suitable inscription, and a purse of sovereigns. In doing so he dwelt upon the great services that Dr. Smith had rendered to the Institute during well-nigh fifty years, and stated that he had done more than any man living to increase its membership, to inspire enthusiasm in its members, and to gather together the scattered remnants throughout Scotland into one homogeneous whole. Dr. Smith, in reply, returned very cordial thanks for the members' mark of esteem for any services he had been able to render to education and to the Educational Institute of Scotland. He then proceeded to give a brief account of the inception of the Institute—at which he was present—and its early history. This was its fiftieth Annual Meeting, and he pointed out, for the sake of his younger brethren especially, that he had never on any account been absent from a single meeting at which he had a right to be present, and assured them that regular attendance at these meetings did not tend to shorten life, to injure health, or to damage reputation. After some little protest, which did not meet with much sympathy, on the ground that the matter should have been submitted to the branches for consideration, it was almost unanimously agreed to grant Dr. Smith a retiring allowance of £40 yearly, with the title of Honorary Secretary, and the position of Assessor to the General Committee of Management.

THE PRESIDENT'S RETIRING ADDRESS.

The retiring President, in his address, dealt with the questions which had occupied the attention of teachers and of the country generally during the past year, and dwelt with considerable fulness upon superannuation, sketching a scheme which he thought a reasonable one from the point of view of all parties interested, and which would enable a teacher after forty years' service to retire on two-thirds of his salary. He next glanced at the Education Bill, and, after noting its merits and defects from a Scottish point of view, expressed the hope that the experience of the past session might tend to show that the best educational system was not evolved from an uncompromising attitude of statesmen and ecclesiastics, but by all meeting upon a common ground to serve the paramount interests of the people. Alluding to the development of Science Schools, he said that that was of great importance, for a judicious blending of literature, science, and manual work would cause that well-known phrase 'Made in Germany' to be less frequently met with in this country. He concluded with a reference to the large increase in the membership—nearly a thousand—during his year of office, and expressed the belief that, with a few more years of loyal effort, the Institute would number within its ranks every teacher in Scotland. The address was listened to with great interest and attention, and, on the motion of Dr. Ross, Mr. Dunlop was heartily thanked, and asked to allow his address to be printed along with the report of the year's proceedings, to which he agreed.

ELECTION OF NEW PRESIDENT.

The President, in accordance with the resolution adopted last year, that the candidate having the largest number of votes recorded in his favour should be nominated for the chair, proposed as his successor Mr. John Adams, M.A., B.Sc., Rector, Free Church Training College, Aberdeen. There being no other name proposed, Mr. Adams was unanimously elected President for the year. The two senior Vice-Presidents, on the instruction of the President, proceeded to find Mr. Adams, but some amusement was caused by the fact that they could not get out, the door being by some misunderstanding locked. They ultimately left on their quest by another door, and while they were absent a telegram of congratulation from Mr. Macnamara, President of the National Union of Teachers, was read amid applause, and a reply reciprocating the fraternal sentiments

DR. MORRISON,
Principal, Glasgow F.C. Training College, Convener of the Board of Examiners.

was despatched. The messengers had by this time returned with the President-elect in charge, and he was duly installed and invested with the chain of office by the retiring President amid hearty cheers. The new President thanked the meeting for his election, and said

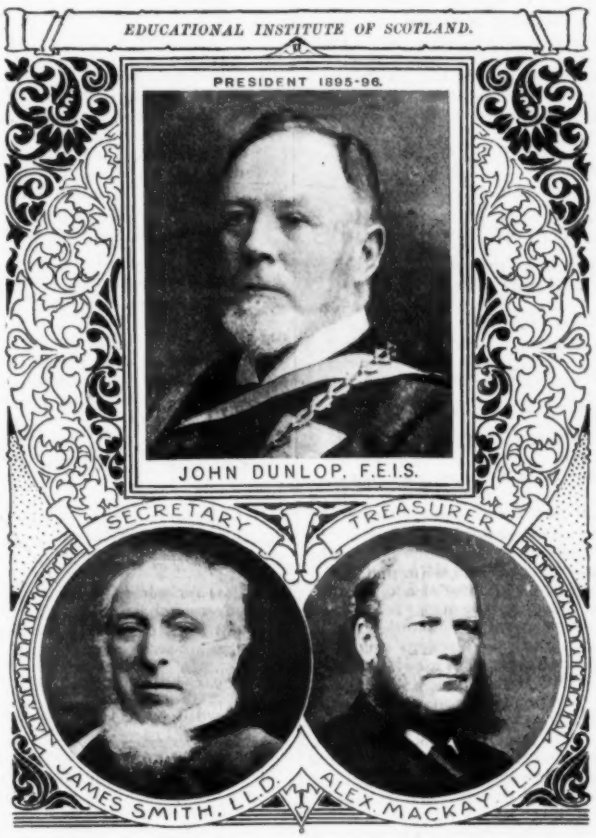
that, as it would be inconsistent with fostering a spirit of brevity if he said anything, he would call for the next business. This facetious remark, which was received with loud laughter, was the keynote to Mr. Adams's action throughout the meeting, and the consequence was that what was generally expected to be an unusually prolonged sitting was got through with great expedition. The President's manner of dealing with members who were inclined to be irrelevant or long-winded was admirable in its courtesy and its curtness, and frequently gave rise to amusement as well as satisfaction. Mr. Adams only requires to continue as he has begun, and much time will be saved in the various committees.

Election of Vice-Presidents.

After some discussion and airing of grievances on the part of provinces in their opinion overlooked in the distribution of these honours, the following were elected Vice-Presidents, and were formally introduced to the President:—Messrs. J. R. Jack, Aberdeen; Robert B. Stephen, Forres Academy; and George A. Innes, Kilmarnock Academy.

Election of General Secretary.

The most important item of the day's business had now been reached—namely, the election of a gentleman to succeed Dr. Smith in the office of General Secretary. For several months past there had been vigorous canvassing by the friends of the respective candidates, Mr. John G. Kerr, M.A., Headmaster of Allan Glen's School, Glasgow, and Mr. John Laurence, Schoolmaster of Old Monkland, Coatbridge; and, while both sides professed to be confident of success, it was generally believed that the contest would be a close one, as the result proved. The nomination of the two candidates having been duly moved and seconded, the voting cards, which delegates had received on entering, were collected in ballot-boxes which were passed round the benches. Thanks to the excellent arrangements of the returning officers, the whole work of taking in and counting the votes was completed in a very short time, and on their re-entering the hall there was considerable excitement. The President, fearing that there would be an exodus after the result was declared, suggested that it should be withheld till after the reception of the deputation from the N.U.T. This was, however, received with such a storm of objection that he at once read the numbers:—Laurence, 288 votes; Kerr, 276 votes. The declaration of the poll met with tremendous acclamation from the friends of the successful candidate, and it was gratifying to observe that amongst the first to congratulate him were some of his rival's strongest supporters. This was as it ought to be, and we have no doubt that the new General Secretary will have the sympathy and support of all members in the discharge of his arduous and highly responsible duties. Mr. Laurence is an able, cultured, and courteous gentleman, and, having amply proved his capacity and his zeal for the interests of the Institute by his twenty years' service as secretary of the large and prosperous Hamilton Branch, we venture with confidence to predict that he will prove an efficient and popular Secretary.



General Treasurer's Financial Statement.

During the counting of the votes for the Secretaryship the General Treasurer, Dr. Mackay, presented his balance sheet showing a substantial increase in the funds of the Institute for the year. The report was adopted, and a motion for the re-election of Dr. Mackay was met with an amendment by the irrepressible gentleman from Aberdeen, which was, however, supported by only some half-a-dozen, the motion being declared carried amid an outburst of cheering.

Reception of Fellows.

Dr. Morrison, the Secretary to the Board of Examiners, next introduced the ladies and gentlemen who had been elected Fellows at the meeting of those holding the title which had taken place in the morning. There were this year 50 of these: 42 (18 of them graduates) recommended by their respective branches, and 8 admitted by direct application. In addition, the degree of Honorary Fellow was conferred upon the Rev. Professor Salmond, Free Church College, Aberdeen; Mr. William Graham, Chairman of the Glasgow Endowment Board; and Mr. Duncan Macdonald, J.P., D.L., Chairman of the Dundee School Board. The new Fellows passed the chair, and were cordially welcomed by the President, amid the applause of the meeting. Professor Salmond returned thanks for the honour conferred upon him, which he appreciated very highly.

Superannuation.

Mr. Kerr, the able and indefatigable Convener of the Committee on Superannuation, was very cordially received on coming forward to submit his report. He made a short but pithy statement, in the course of which he observed that there was good reason to hope that next year a beginning would be made to secure a Superannuation Scheme on the basis of the Equivalent Grant. The report was received with great satisfaction.

Deputation from the N.U.T.

Mr. Bowden, of Gateshead, who had been deputed to represent the National Union of Teachers in England, was at this stage introduced by the President, and enthusiastically received by the meeting. After presenting the fraternal greetings of the N.U.T., he, in an eloquent speech, discussed, amongst other matters of interest to teachers on both sides of the Border, the recent Education Bill. He claimed that the defeat of the Bill lay more at the hands of the Union than anywhere else. They thought the Bill on the whole a bad one, and had consequently opposed it. Another Bill was expected in January, and unless it was based on different lines, it would be as strenuously opposed as the one which had preceded it. The President, on behalf of the meeting, thanked Mr. Bowden for his presence and his address, and assured him of the hearty good-will of the Institute towards the sister Association in England.

The Annual Congress.

It was unanimously agreed, on the invitation of the Local Association of Aberdeen, to hold the next annual Christmas Congress in that city.

Miscellaneous.

After a short interval the meeting took up consideration of the minutes of the General Committee of Management for the past year.

It was expected that some discussion would take place on these minutes, but, no one rising, the President, with the some promptitude which had characterised his action throughout the day, passed on to the next item of business. This consisted of overtures in regard to the constitution and election of the General Committee of Management, the Equivalent Grant in relation to Secondary and Technical Schools, and the study by teachers of French and German by residence abroad. These having been disposed of, Mr. Duthie moved an overture from the Aberdeen Branch, to the effect that the present conditions on which teachers hold office, especially under small School Boards, are unsatisfactory, and are seriously detrimental to the interests of education, and that the Institute should take steps to remedy the evils. In proof of the need for action he referred in a spirited speech, which was loudly applauded, to the Arnage case, which is causing great excitement and indignation in the North. The resolution was seconded by Mrs. Skea, and was carried amid great enthusiasm. The business remaining was for the most part merely formal, and included District Representation, Election of Committee of Management, Appointment of Auditors—the three being re-elected—Report of Board of Examiners, and Election of Board of Examiners. These matters were speedily settled, and one of the largest and most successful meetings the Institute has ever held was brought to a close with a vote of thanks to President Adams, who had won golden opinions for his admirable conduct in the chair.

MODEL ANSWERS TO QUEEN'S SCHOLARSHIP QUESTIONS.

CHRISTMAS 1895.

DOMESTIC ECONOMY—WOMEN.

You are only allowed to answer one question in each section.

SECTION I.

1. Define 'Food.'

In nitrogenous and carbonaceous foods, what other elements are usually present besides nitrogen and carbon respectively? Give an analysis showing the constituent elements of eggs and of bread.

Food comprises everything we eat or drink for the purpose of sustaining life. The necessity for it arises from the fact that the body wastes away as a result of our life and work, and that it requires additional new matter for the purpose of adding to its substance during the time of growth. The matter required to replace that which has wasted away, and to add to the bulk of the body, is supplied by food. The vital functions cannot go on unless a certain heat is maintained. This heat is produced by chemical combination within the body. The elements which combine chemically for the purpose of producing this heat are introduced into the body as food.

In nitrogenous foods, carbon, oxygen, hydrogen, phosphorus, and sulphur are present in addition to nitrogen. Carbonaceous foods, in addition to carbon, contain hydrogen and oxygen.

Eggs contain about 14 per cent. of nitrogenous matter, more than 10 per cent. of fat, and from 1 to 1½ per cent. of saline ingredients. They also contain small portions of sulphur and phosphorus.

Bread contains about 20 per cent. of nitrogenous matter, 60 to 70 per cent. of starch, 2 to 3 per cent. fatty matter, and about the same percentage of minerals.

It also contains small percentages of phosphates and salts.

2. Explain carefully the several functions of 'food,' and the nature of the foods respectively suited for each of those functions.

Food discharges the following functions: (1) To repair the waste of the body; (2) to add to the substance of the body during the period of growth; (3) to keep up the temperature of the body, and to reduce the waste products to forms in which they can be easily removed.

All varieties subserve more or less each of the above purposes, but certain varieties of food fulfil more especially one or more of the functions mentioned above. Thus proteids discharge more especially the first and second functions, whilst fats and carbo-hydrates more especially discharge the third function. The broad differences between the composition of these three classes of foods are that proteids contain, mainly, the elements oxygen, hydrogen, carbon, and nitrogen, whilst fats and carbo-hydrates contain oxygen, carbon, and hydrogen, fats containing less oxygen in proportion to hydrogen than is the case with carbo-hydrates.

SECTION II.

3. Explain, with clear reasons, what you should be careful not to do when washing (1) coloured cottons, (2) woollen articles.

In washing coloured cottons, soda should not be used, nor soap put on them, as both of these cause the colour to run.

If the tap-water is not soft, rain-water should be used. They should be washed in a lukewarm lather. If the colour runs, they may be rinsed in cold salt water after washing, or in a solution of vinegar. They should be hung to dry as soon as possible, and should not be exposed to the sun if it is strong.

Woollen articles should not be rubbed, as that makes them hard and stiff. They should not be put in too hot or in too cold water, as in either case they will shrink. Cold water, too, will not remove the grease. They should be thoroughly wrung after washing, and hung out to dry at once.

4. There are two ways of making starch; give clear instructions for each; and explain for what purposes each is specially suited.

There are two ways of making starch—(*a*) with cold water, (*b*) with boiling water.

To make cold-water starch, add one breakfast-cupful of cold water to each tablespoonful of starch, and add half-a-teaspoonful of borax dissolved in a little boiling water. A few drops of turpentine added will prevent the iron sticking. Break up the starch with the fingers while pouring in the cold water. Then add the dissolved borax and the turpentine. Stir it up each time it is used, as the starch, being heavy, sinks to the bottom.

Cold-water starch is used for articles which require to be very stiff, such as shirts, collars, and cuffs.

To make hot-water starch, mix and break up the starch with cold water, adding enough to make it of the consistency of cream. Add a very little tallow, and pour on boiling water till it clears and becomes thick. Stir it while pouring in the boiling water to prevent lumps forming. Half-a-teaspoonful of borax dissolved in boiling water should be added for each tablespoonful of starch.

Boiled starch is used for articles such as dresses, curtains, laces, and muslins, which require only slight stiffening.

5. Write notes of a lesson, as for an elder class of girls, showing how to dress *suitably*, *economically*, and *healthily*.

I. *Choice of materials.*

(*a*) *Suitability.*—Do not buy merely showy goods, but go in for serviceable materials, suited to your station. Choose colours least likely to fade. Grey, deep-brown, olive-green, and dark blues are serviceable colours.

(*b*) *Economy.*—It is false economy to buy goods merely because they are cheap. A little extra expenditure is often rewarded by a longer wear. Do not purchase ornamental articles till necessaries are bought.

Serges are very economical materials for dresses. They will wash and clean with benzine or ammonia. For summer clothing thin cloth is more economical than alpacas, which are liable to shrink when wet.

(*c*) *Health.*—Dark-coloured garments are preferable for winter wear, as they absorb heat; light-coloured for summer, as they reflect it. Flannel is healthiest next the skin in both summer and winter, as it is a bad conductor of heat, and absorbs the perspiration from the body.

II. *Making-up of material.*

Avoid the two extremes of slackness and tightness in outer dresses round the waist. Too great slackness is inelegant, and too great tightness causes pressure on the vital organs—lungs and heart—thus deranging the circulation, and perhaps causing curvature of the spine. As far as possible, clothing should not hang from the waist by bands. Boots with pointed toes should be avoided. They cause pain, check the circulation, and lead to permanent deformity of the foot.

III. *Cost of materials.*

For underwear, flannelette at 5d. per yard, calico 6d., twilled calico 5d. or 6d.

For dress materials.—Serges, 2s. 6d. per yard; prints, 6d.; cloth, 2s. 6d.; alpacas, zephyrs, etc., from 6d. to 1s. 6d.

The following estimate of an outfit may be given :—

	£	s.	d.
Underlinen		14	0
Stockings (3 pairs)		6	0
Boots (2 pairs)		19	0
Best dress	1	10	0
Second dress	1	5	0
House dress		8	0
Underskirts (two)		9	0
Jacket	1	10	0
Hat		8	6
Sailor hat		2	6
Mackintosh		15	0
Gloves (2 pairs)		3	0
Umbrella		5	6

IV. *Care of clothes.*

Dust should be removed every time outer garments are taken off. Dresses and jackets should be hung up to avoid creases. If not in use, look out carefully for any appearance of moths. Shabby and faded dresses can often be made to look as good as new by being dyed. Boots should never be allowed to get too bad before being repaired, or the uppers may go. Stockings should be carefully darned as soon as a hole shows itself.

Section III.

6. 'A dirty house is an unhealthy house.' Establish the truth of this saying; and state what should be done at regular intervals so as to keep a house clean.

A dirty house is an unhealthy house, because the dirt which is allowed to accumulate by neglect is not all of an innocuous character. If it were only dust, mud, or clay, it would be offensive to the eyesight, but not harmful to health, except so far as the dust arising from unswept carpets, etc., is breathed into the lungs, and causes respiratory troubles. The matter which is brought in by the inmates, or blown in by the air, is often impregnated with the germs of various diseases, and helps to form a lodgment for them. We can only remove them by systematic sweeping, cleaning, and scrubbing. A dirty house is also unhealthy because it operates against the cheerfulness and good spirits of its inmates.

To keep a house clean, a regular system should be pursued. Each day should have its work, and the work should be finished in the day, so as not to encroach on the work of the next day. Living rooms should be swept and dusted every day, and, if covered with linoleum, the floors washed twice a week. The space under the beds should be swept out every day, and landings and staircases dusted as frequently. Carpets in other rooms should be swept once a fortnight, and the rooms dusted every day if possible. Steps should be swept and hearthstoned every day, walls dusted once in every two or three weeks. Bedroom carpets should be taken up, and floors scrubbed once a fortnight. Carpets of best rooms which are little used should be taken up and well brushed and beaten, and the floors scrubbed, every spring. All the paint should be thoroughly cleaned at least twice a year.

7. What average temperature should we aim at maintaining in our *living*, *sleeping*, and *cooking* rooms?

What are the difficulties in the way of this, and how would you propose to overcome them?

For living and sleeping rooms an average temperature of 65° to 70° is pleasant and healthy. In cooking rooms we may not be able to keep so low a temperature, but careful management can do much to prevent the temperature in these rooms remaining excessively high for a long period.

In living rooms the difficulty in winter is mainly to maintain the temperature at a proper level. An open stove, with a back of fire bricks, will be found best for heating the room. It also gives the room a cheerful appearance, whilst at the same time it assists in ventilating it.

The great difficulty with sleeping rooms is to secure sufficient ventilation to prevent them becoming stuffy and unpleasantly warm. A good plan is to raise the lower sash a few inches, and fill in the opening with a piece of wood specially made to fit. An inlet is thus provided between the two sashes.

In cooking rooms good management will prevent undue heat. A screen placed round the stove will prevent the diffusion of heat into the room. As far as possible, all cooking requiring a great heat should be done as early as possible in the morning, before the heat of the sun is felt, and the fire should be allowed to die down when the heat is no longer required. Great attention should be paid to ventilation and to the proper management of the dampers of a kitchener.

8. In a dwelling-house, what are the causes that operate against purity of atmosphere? How do you propose to meet these and to establish a healthy condition of air throughout?

The causes which operate against purity of atmosphere in a dwelling-house are too crowded rooms, keeping doors and windows always closed, opening bedroom windows but rarely, use of heavy hangings over doors, uncleanliness in the persons or clothing of the inhabitants of the house, too infrequent change of bed linen, too little scrubbing of floors, and contamination of air by too little flushing of w.c.'s in or near the house, or by allowing vegetable refuse to accumulate and decay in the dust-bins.

The statement of these causes points to the way to remedy them. Doors and windows should never be kept closed till the staleness of the air in the rooms becomes perceptible to the sense of smell. Rooms should be regularly ventilated as a matter of daily practice. The inmates of the house should pay proper attention to cleanliness both of persons and clothes. Body and bed linen should be regularly changed. W.c.'s should be frequently and regularly flushed. In this matter it is better to err by excess than by defect. Vegetable refuse should always be burnt, and never put into a dust-bin.

Section IV.

9. To maintain a high standard of health, it is needful to regulate our lives carefully as regards *air*, *food*, *work*, *cleanliness*, and *rest*. Comment upon this statement, giving practical advice under each of those five heads.

The truth of the statement given is incontestable, but some well-thought-out directions are necessary to enable us to put it into practice.

As regards *air*, it is advisable to make provision for the constant outlet of exhausted air and inlet of good air. A room in which impure air is allowed to accumulate before fresh air is admitted becomes hot, and when fresh air is admitted, there is a draught. The window of a sleeping room should be opened a little to let in fresh air. The windows of a class-room should never be entirely shut, and during the intervals of play and dinner-time both doors and windows should be opened as wide as possible to admit of the renewal of the air.

With regard to *food*, we should regulate our meal times so as to make them neither too far apart nor too close. Simple and substantial food is better than dainties. We should not continue to eat till the cravings of hunger are fully satisfied, especially if we have to recommence work soon after eating. Suppers should be light, and should not be taken immediately before going to bed. We should carefully eschew any food which always produces unpleasant after-effects on us. Tastes and constitutions differ much, and only our own personal experience can be to us a sufficient guide as to what food is suitable for us.

Nothing is more conducive to a long and vigorous life than moderate work of a congenial character. If we do not find our work congenial, the best thing is to exchange it if possible for congenial work. If we cannot do so, we must try to take an interest in the work which seems uncongenial. It will probably in time become congenial to us, and the mental irritation we feel will disappear. Work should not be engaged in to excess. By regulating our work, and finishing up as far as possible each day's task within the day itself, we can guard against having to go in for spells of excessive work. Work should not be continued till a late hour at night.

Cleanliness helps to maintain a high standard of health by promoting a healthy action of the skin. The internal organs also do their work more effectively if the pores of the skin are kept open by cleanliness. Unsightly and irritating sores and blotches often follow as a result of uncleanliness.

Proper rest is necessary to enable us to go to our daily work with vigour and cheerfulness. In no occupation is a sufficient amount of rest more essential than in that of a teacher, who is subject to so much nervous strain. At least eight hours' rest per day is necessary. The bedroom should be well ventilated, and feather beds should be eschewed. A horse-hair mattress, though harder at first to the body, will be found in the end much more resting.

Section V.

10. In the sick-room, what uses are made of *barley*, *beef*, *bread*, *eggs*, *lemons*, *isinglass*, *milk*, *rice*, *linseed*?

Barley is used in the sick-room to make barley-water to serve as a quencher of thirst.

Beef is used for making beef-tea, which is used as a stimulant in the case of great weakness.

Bread toasted can be used to make toast-water, and boiled with milk to make bread and milk. Bread can be toasted for patients whose appetite needs tempting.

Eggs can be beaten up with milk, or, if medically ordered, with brandy or wine. They are more digestible when taken this way. Eggs can be poached or even boiled lightly for convalescent patients.

Lemons can be used for making lemon-water to quench thirst.

Isinglass can be prepared in various ways as a strengthening food.

Milk can be boiled, when it serves both as a soothing drink and as a strengthening food, which is easily retained on the stomach of a weak patient.

Rice can be boiled with milk as a food for a patient who is not able to take more solid food.

Crushed *linseed* can be used for making poultices. Whole linseed boiled with liquorice can be used in cases of cold and bronchitis where there is great irritation of the air-tubes.

11. Write out (1) the chief qualifications of a sick-nurse; and (2) the principal rules by which she should regulate her life and work in the sick-room.

A sick-nurse should be sympathetic, patient, of good bodily health, cheerful in disposition, neat in dress, firm in manner, and obedient to the doctor's orders. She should have some elementary knowledge of physiology. She should possess along with her firmness tact in dealing with a patient's whims and humours.

In the sick-room the nurse will have many occasions calling for the exercise of the qualities mentioned above. She should be gentle in handling and washing the patient, should observe the doctor's rules as to administration of medicine and food, change of bandages, admission of light, ventilation, and preservation of the temperature required. All her movements should be as noiseless as possible, and she should not wear creaking shoes or rustling garments. She should be clean and tidy in her person, and should serve up the patient's food in an appetising manner. She should observe strictly the doctor's rules as to admission of visitors, and should not worry the patient with unnecessary talking. During convalescence, however, she may, if the nature of the patient's disorder permits of it, relieve the tedium the patient feels by a little conversation or reading aloud.

SECTION VI.

12. Explain how thrift may be exercised in regard to *food*, *fires*, *clothing*, *drinks*, *furniture*, *health*, and *recreation*.

Economy may be exercised in food by serving up cold meat in stews and pies, making bread puddings out of broken pieces of bread, frying potatoes and cabbage left over from a previous meal, utilising the dripping obtained in roasting in pie-crusts, and as a substitute for butter, and in many other ways.

Expenditure in fuel may be saved by careful making of fires, so as to use only the absolutely necessary amount of wood in lighting, pushing in the dampers of kitchen ranges when a great heat is no longer required for cooking, carefully sifting the cinders and using the largest again, and, wherever possible, by buying a stock of coal for the winter during the summer, when prices are much lower.

Careful habits will do much to prevent unnecessary expenditure on clothes. Clothes should be carefully folded and put away after being used. If put away for any length of time, camphor, &c., should be put with them as a preservative against moth, and they should be periodically inspected to detect any traces of moth. A small expenditure on cleaning or dyeing proves often cheaper than buying new clothes. Walking dresses and boots should not be worn when sitting at home. A careful mother can save money by altering and adapting for younger children clothes which older children have outworn.

For persons who are not teetotalers malt drinks are less harmful than spirits. Beer bought direct from the brewers in casks is more palatable and cheaper than when bought as needed. Oatmeal water, home-made lemonade, and weak dilutions of lime-juice are very palatable and cheap drinks for those who do not take intoxicants.

Thrift may be exercised in furniture by buying good furniture to commence with. Cheap furniture is often made of badly seasoned wood, which subsequently shrinks, and couches, chairs, &c., are stuffed with poor hair. It is far cheaper in the end to pay a good price for a substantial article than to get a showy but poorly-made article at a cheap rate. Systematic cleaning and polishing and careful usage will do much to make furniture last. If any of the rooms are exposed to the sun in the hottest part of the day, the blinds should be drawn, or carpets and hangings will soon fade.

Nothing more conduces to thrift than carefully preserved health. Good hours, simple but substantial food, careful dressing, thorough washing, and the cultivation of a cheerful disposition will do much to preserve health, and to save the expense of doctors' bills.

Thrift may be exercised with regard to recreation by taking it regularly. It is more economical to keep one's health up to a high level by regular recreation than to overwork oneself by working uninterruptedly without recreation, and having, perhaps, to put aside all work for a lengthened period.

13. Explain the advantages and disadvantages as forms of investment of mortgages, savings banks, railway companies, gas companies, annuities, building societies.

Mortgages are sums of money lent upon the security of land, houses, or other property. Payment of interest on mortgages and repayment of capital take priority over other payments. If the money lent on mortgage is lent on sound property, and is not in excess of what the property might be expected to fetch in the event of a forced sale, this is a very good and safe form of investment.

Savings Banks earn their interest by investing depositors' money. If the investments are only of a high class character, and if there is a regular and competent audit of the books of the bank, this should be a safe form of investment.

Railway Companies.—There are various kinds of railway stock, *e.g.*, debentures, preference shares, and ordinary shares. As these have claims on the net profit of the company in the order in which they are named, debentures are the safest investment, and ordinary shares the least. Before making any investment in railway shares a good broker should be consulted, who can give information as to the past earnings of the company and its future prospects.

Gas Companies of old standing are a very safe form of investment. Their capital is very often divided as in the section above, and with varying degrees of safety. A debenture holder pays for his additional security by the lower rate of interest he gets on his investment.

Annuities commend themselves to many people, and especially to single women, as a good investment. If, however, there is no provision for a return of a portion of the payments in the event of death before the age at which the annuity becomes payable, this form of investment is too much in the nature of a lottery to be recommended.

Building Societies require careful examination before any investment is made in them. By periodical payments to a terminable building society, people with limited opportunities for saving can buy a dwelling-house without pinching themselves to do so. Depositors in a good permanent building society need have little anxiety about their money, and there are many such societies doing a good and sound business, in which it would be quite safe to take shares. In both kinds of building societies much will depend on the efficiency of the auditors and other officials, particularly of the surveyor.

Owing to the great demand for the numbers of the present Volume, both July and September are quite out of print. Orders for the

SPECIAL AUGUST NUMBER

should be given at once, as only a very small stock remains on hand.

Our Science Section.

Subscribers requiring Explanations of Difficulties in any Branch of Science, or Advice upon Courses of Study, can obtain all help required by communicating with the Editor, and accompanying their query with the Coupon cut from this No.

THE NEW SCIENCE DIRECTORY FOR 1896.

THIS Directory of Science Directors becomes yearly of more and more importance as science teaching spreads in our schools, and, despite the little encouragement given by the Department of Science and Art, the spread is nowhere more conspicuous than amongst our primary schools.

In going through the 309 pages we light upon no bolt from the blue in the shape of a startling departure from precedent, although we do here and again hap upon changes which must be chronicled duly, and which must be digested by him of the Science School.

Imprimis we read that 'an account of the receipts and expenditure of each school must be furnished annually by 30th November to the Department.' This is to secure the spending of all science grants upon science teaching, and to obviate 'farming.'

'No student may be registered for a session who has not commenced to attend before 1st November.' This will prevent the late-comers from benefiting the class, even if they are prepared to come often in atonement for having come late.

An innovation of great interest is the provision of Day Examinations for students. Though mainly intended for the members of Day School and Training College science classes, other students are not debarred from presenting themselves thereat. The wisdom of this new departure is apparent on the face of it. It is to be noted that 'Day Examinations are confined to the Elementary and Advanced Stages of those subjects which are chiefly taught in day schools and training colleges.'

Let London private students note that 'no candidate can in future be examined at the Departmental Buildings, South Kensington . . . . except such as are called up for Honours.'

With the new system of payment according to attendance as an alternative, it is not to be wondered at that special provisions as to registration have been made. Briefly put, these are as follows :—

1. Separate registers are to be kept, not only for separate subjects, but for the separate stages of these subjects.

2. No student can be registered in the Elementary Stage for more than two years ; no student can be registered in the Advanced Stage, unless he has passed the Elementary Stage or some equivalent examination. FAIR PASSES CAN BE TAUGHT EITHER THE ADVANCED OR THE ELEMENTARY STAGES.

3. A minimum of 10 attendances is required before the attendances of a student can rank for payment.

4. Registers must be marked before or immediately after the commencement of a lesson (not later than 15 minutes after), and the time of registering must be stated, and from this time must be counted the hour or hour and a half constituting a lecture.

5. No attendance can be registered for a grant under both the Education and the Science and Art Department. If, therefore, Science be taken in a grant-aided elementary school, the pupils must be marked absent in the ordinary registers whenever a science lesson is given. This is a distinct blow to science teaching in the primary school, and should be fought tooth and nail.

Under the head of Inspection it is to be observed that the Inspector will note (1) if the classes be too large—40 being the maximum for a theoretical, and 25 for a practical lesson ; (2) whether the instruction in science is adequately illustrated by experiments ; (3) whether the Elementary and Advanced Stages are taught apart.

The great change in the Directory, viz., that referring to the new scheme of Grant-Aid, has already been announced in these columns. It but remains to say how miserably inadequate the suggested payments are in the case of large successful classes, which inadequacy will be further emphasised by the restriction as to the size of classes. Something very drastic should be done here if Science teaching is to attract such good men as heretofore. The wise course would be to permit, in perpetuity, the option allowed for this year, as the new mode of payment is favourable to classes of students not brilliant enough to score passes, but sufficiently painstaking to get real good out of their teaching.

The science student, who is a mere mathematician and nought else, is to go, for no attendance grant is to be made to a class in Mathematics, unless 50 per cent. of the students are 'in' for and receiving instruction in other subjects of science.

The Organised Science School is left mainly where it was, except that the 40 and 25 maxima obtain here, as elsewhere, a provision that will not be seriously cavilled at, and which may be useful in keeping down the large classes found in the primary school.

Here, again, Mathematics receives a check, as at least 8 of the 13 obligatory hours must be devoted to Sciences other than Mathematics.

In addition, no attendance grant will be paid on students whom the Inspector reports as not fitted to take the whole of the Elementary course, nor on those who enter after November 1st, nor upon any students who do not satisfy the Inspector, a provision that may resolve itself into 'payment by results,' if not carefully watched. Candidates for National Scholarships must carefully note—(1) that a minimum of previous successes will be exacted as a preliminary to admission, and (2) that the Sciences are now arranged in courses, one only of which may be taken by the candidate.

Under Training Colleges it is noteworthy (1) that the suitability of the premises, fittings, apparatus, and teaching will be insisted on, and (2) that not only will questions be set as to the methods of teaching science subjects, but also that *the answering of one or more of these questions may be compulsory*, a step in the right direction.

Under Arts the chief changes are those referring to the elementary Day School : (1) 'Where the award is less than the previous year, the grant will not be reduced without a warning, unless there is a very marked falling off in the work done.' Considering the many times the Department has had to eat its own awards, it is perhaps excusable that this somewhat contradictory regulation should stand.

(2) In small schools (viz. with an average not exceeding 60, or schools with only one teacher, or one teacher and one pupil teacher or monitor), the subjects of instruction may be grouped, and need not extend beyond Standard IV., except that Standards VI. and VII. must be taught Geometry and Model Drawing in addition.

(3) After May 1st, 1896, comes the great financial concession, by virtue of which the lowest grant will be 20s., 25s., or 30s., according as Excellent, Good, or Fair is the mark obtained. At length the Department has been shamed into dropping the ridiculous 5s. and less grants for Drawing, and perhaps later on the £1 minimum may become £5, for it is certain that little can be done in the way of drawing instruc-

tion in the smallest school without the expenditure of a £5 note.

Evening Continuation School students may now aspire to the dignity of cards of merit after working successfully two subjects of the syllabus.

As to the syllabuses, the only point is in connection with the elementary stage of XXIII. (Physiography). Here we have the addition of a Section I., wherein are included all the theoretical considerations germane to the Elementary Stage without a detailed practical application. This Section I. may be taken by itself in one year, and will be paid for as a separate subject. The elementary stage proper of the subject may be taken afterwards, and payment again be claimed so that the elementary stage of this encyclopædic subject has thus been broken up into two portions, one of which may be taken in each year.

Whilst Physiography has been enriched by the addition of a new Stage I., Physics has been impoverished by the deletion of the Alternative Elementary Physics Course, a step which, like all the doings of the Science and Art Department, has been abruptly taken, with no thought as to the arrangements or wishes of the teachers, who, until the issue of the Directory, are invariably in a happy state of ignorance as to what the gods, in the shape of the Science and Art Department, have in store for them. It would be interesting to learn what has caused this *volte-face* movement with respect to Physics, and also to be told whether or no Alternative Elementary Chemistry is soon to suffer a like fate.

The Honours Examination in Practical Inorganic Chemistry has now been placed beyond the reach of the ordinary student, who will not give up four days to a practical examination in Chemistry, let the Department think as it may.

As to the general tendency of the alterations, we may say that some are wise and some otherwise. It is certain that the Department is crassly unsagacious in so persistently discouraging science teaching in primary schools which are unable to constitute themselves into Organised Science Schools. Equally regrettable are the proposed amounts to be given in lieu of the old payments for examination successes—the adoption of which would spell ruin to many deserving classes.

Query.—Why is it that, with all the the bother about 'Made in Germany' ringing in its ears, the Department should so ingeniously set about the suicidal work of discouraging science teaching, except in those wealthy Institutions that can successfully defy discouragement? Surely in no direction is there more need for generous expenditure than in that of scientific and technical instruction.

MODEL ANSWERS TO HONOURS STAGE, INORGANIC CHEMISTRY, 1896.

Honours Examination.

64. A specimen of nickel speiss, containing arsenic, iron, nickel, and a little cobalt, is to be analysed. How would you proceed to separate its constituents for quantitative estimation? (64.)

64. Treat about 2 grams of the finely powdered speiss with HNO_3, and, supposing a solution free from silica, etc. to have been obtained, proceed to pass H_2S through the solution to precipitate the As, and filter. The As_2S_3 is dissolved in KOH and treated with NH_4OH and magnesium mixture, and finally determined in the usual way as $Mg_2As_2O_7$.

HNO_3 is now added to the filtrate containing Co, Ni, Fe, and, after boiling, Na_2CO_3 is added to neutralise. Precipitate the iron as hydrate by addition of NH_4OH, and determine as Fe_2O_3 after ignition.

Upon the addition of KOH to the boiling hot filtrate, both Ni and Co are precipitated. The precipitate is separated by filtration, and, after washing and drying, is removed from the filter paper. This paper is a weighed one, so that after washing and drying, when this is again weighed, the excess gives the weight of mixed Ni and Co on the paper. The proportion of each is easily calculated after the proportion of Ni and Co in the precipitate has been determined, which is usually done in the following way:—The precipitate is dissolved in HCN and KOH, and after boiling, yellow mercuric oxide (from precipitation) is added, which causes the Ni to precipitate after the boiling, the Hg combining with the liberated cyanogen. The precipitate is dried and heated in a crucible to expel the HgO. The filtrate is now neutralised with HNO_3, and a neutral solution of $HgNO_3$ is added to excess, which precipitates the Co as cobalticyanide, and this, after being thoroughly washed, dried, and ignited, until its weight is constant, is weighed as Co_3O_4.

65. It has been shown that the presence of moisture is necessary for the explosion of a mixture of carbon monoxide and oxygen, and for the combustion of phosphorus, carbon, and sodium in oxygen. What hypotheses have been suggested with a view to the explanation of these facts? (64.)

The simplest theory in explanation of the necessary presence of H_2O in the explosion of CO in O, and the combustion of P, C, and Na, is that steam plays the part of oxygen carrier much as NO or N_2O_3 does in the leaden sulphuric acid chamber, thus—

$$\left\{\begin{array}{l} 2\,CO + 2\,H_2O = 2\,CO_2 + 2\,H \\ 2\,H_2 + O_2 \quad\;\; = 2\,H_2O. \end{array}\right.$$

Professor Armstrong is of opinion that H_2O acts as an electrolyte, and that chemical change only takes place when CO, steam, and O are in contact.

In the opinion of Professor Thomson, steam by forming liquid particles produces dissociation of the oxygen molecules, and this facilitates the oxidation of CO.

Mendeléef considers that CO cannot combine directly with O because all combinations between gases take place according to the law of equal volumes. CO and steam react in equal volumes, and, therefore, the change begins by the CO taking O from steam. That liberated, H combines with its own volume of O to form H_2O_2, and this in turn reacts with its own volume of O to form H_2O_2, which again reacts with its own volume of CO to form CO_2. To this it is objected that the spark will not kindle a mixture of dry CO and N_2O in equal volumes, although the addition of a trace of steam renders the mixture explosive. Lothar, Meyer, and Bertholet attribute the influence of steam to the fact that direct action of CO on O requires a very high temperature, whereas CO decomposes steam much more readily. But although this explains how it is that steam facilitates the oxidation of CO, it does not explain why CO does not combine with O at very high temperatures in the absence of moisture.

It has also been advanced that the dissociation of CO_2, which is held by Bertholet and Deville to limit the combination of CO and O, may be the reason why CO and O do not unite at high temperatures, but do so as the gases cool down. The reaction between steam and CO gives out little heat, so that CO_2 might be formed indirectly, and the liberated H might reform steam, which could exist at a temperature at which CO_2 would be broken up. The union of dry CO and O without flame on the surface of Pt may be due partly to the power of the metal to conduct away heat. The question as to combustion of P, Na, and C is explained in the same way as the above.

66. Give an account of the chief products formed by the interaction of sodium or potassium nitrite upon a neutral or acid sulphite. How would you test for hydroxylamine in a solution containing a nitrate, a nitrite, and ammonia? (72.)

By the action of an ice-cold solution of $NaNO_2$ upon $NaHSO_3$, a compound having the formula $N(OH)(SO_3Na)_2$ is formed, which may be termed ammon-hydroxylamine-di-sodium sulphonate. The potassium salt may be formed in the same way or by adding KCl to the solution obtained from the addition of $NaNO_2$ to $NaHSO_3$. The equation is—

$$NaNO_2 + 2\,NaHSO_3 = N(OH)(SO_3K)_2 + NaHO.$$

On boiling with water the two SO_3K groups are replaced by hydrogen, forming first $NH(OH)SO_3K$, and finally NH_2OH.

To test for NH_2OH in the presence of a nitrate, a nitrite, and ammonia, we add a solution of $CuSO_4$, whereupon an orange coloured precipitate of Cu_2O is formed.

67. Give an account of some of the more striking results of the employment of the electric furnace, for purposes of reduction, by Moissan. (60.)

By means of his electric furnace, Moissan has been able to reduce with ease and speed the more refractory metals, such as uranium, tungsten, molybdenum, vanadium, chromium, as well as magnesium and aluminium.

In each case the ore, consisting of oxide or of some compound such as the ammonium salt readily convertible into oxide, was placed in the furnace mixed with the carbon obtained by charring sugar.

A current of from 350 to 1,000 ampères and 70 to 80 volts was used, and the reduction took place in from two to twenty minutes, considerable quantities of the cast metal being obtained mixed or combined with varying percentages of carbon.

The action of the furnace is thus described by Moissan himself:—'As the temperature rises, lime, strontia, and magnesia crystallise in a few moments. If the temperature reaches its maximum, the very material of the furnace, quicklime, melts and flows like water. Carbon quickly reduces CaO, the metal being abundantly liberated. Cromium oxide and magnetic oxide of iron melt rapidly at the onset. Uranium sesquioxide heated alone is converted into the black oxide. Uranium oxide, which is not reduced by carbon at the highest temperature of other furnaces, is rapidly reduced in the electric furnace, and it is easy to obtain in ten minutes a regulus of 100 grams of uranium. Nickel, cobalt, manganese, and chromium are reduced in a few minutes.'

By means of the furnace it has been demonstrated that Cr is more infusible than platinum, and that molybdenum, uranium, tungsten, and vanadium have a still higher degree of infusibility.

68. Write the formulæ of the known compounds of phosphorus with the halogens, including fluorine, and state the effect of heat and the action of water upon each of them. (60.)

The following is a list of the known compounds of phosphorus with the halogens:—

(1) *With chlorine.*
Phosphorus trichloride, PCl_3.
Phosphorus pentachloride, PCl_5.

(2) *With bromine.*
Phosphorus tribromide, PBr_3.
Phosphorus pentabromide, PBr_5.
Phosphorus bromochloride, PCl_3Br_2.

(3) *With iodine.*
Phosphorus di-iodide, P_2I_4.
Phosphorus tri-iodide, PI_3.

(4) *With fluorine.*
Phosphorus tri-fluoride, PF_3.
Phosphorus pentafluoride, PF_5.
Phosphorus trifluodichloride, PF_3Cl_2.
Phosphorus trifluodibromide, PF_3Br_2.

The table below gives the result of the action of fire and water upon each of these halogen compounds of phosphorus.

Body.	Action of Heat.	Action of Water.
PCl_3	Boils at 76 and combines with O to form $POCl_3$.	Decomposed by water. $PCl_3 + 3H_2O = PO_3H_3 + 3HCl$. With hot water the action is violent, and amorphous P forms after combustion.
PCl_5	Melts at 148 and dissociates into $PCl_3 + Cl_2$ when more strongly heated.	Decomposed by water. $PCl_5 + H_2O = POCl_3$, or with excess of water $PCl_5 + 4H_2O = PO(OH)_3 + 5Cl$.
PBr_3	As in the case of PCl_3.	Do.
PBr_5	Do.	Do.
PCl_3Br_2	On melting decomposes into two layers or solutions of the two bodies in one another at 35° = $PCl_3 + Br_2$.	
P_2I_4	Melts and gives off dark red vapour at 110°.	
PI_3	M.P. 55°.	Decomposed by water into HI and PH_3O_2.
PF_3	Inexplosive when heated with air; explodes when heated with half its vol. of oxygen, forming POF_3.	When pure only, very slowly decomposed by water. $PF_3 + 3H_2O = H_3PO_3 + 3HF$.
PF_5	Incombustible; decomposed by electric spark of from 150 to 200 mm. in length.	Rapidly decomposed by water, forming hydrofluoric and phosphoric acids.
PF_3Br_2	Decomposed. $5PF_3Br_2 = 3PF_5 + 2PBr_5$.	Decomposed by water, forming HF, HBr, H_3PO_4.

CHEMISTRY NOTES.

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(*a*) Elementary Stage.

We shall have but little to say on this part of the subject, except in reply to our correspondents, either teachers or students, whom we will gladly advise upon points of difficulty. One need scarcely urge at this late hour the need for practical work by the students, even, and indeed especially, when Xp is not being taken. There is no doubt as to what is wanted by Professors Reynolds, Tilden, and Hartley, the difficulty is to supply the want. This can only be done by training the observant powers of the students to the utmost, and by also exercising them in minutely describing what has been seen. This is not easy, especially for young students, hence the necessity for sedulous care in this particular, as the be-all and end-all of elementary chemistry. Amongst many good text-books are those by Newth, Jago, Roscoe, Sexton, Reynolds, and the little book by Prof. Tilden which contains the substance of his address to teachers on the subject.

(*b*) Advanced Stage.

To feel quite sure of obtaining a 1st class in the Advanced Stage, the student is advised to carefully read the first three parts of Prof. Reynold's 'Experimental Chemistry for Beginners,' Prof. Tilden's 'Elementary Chemical Philosophy,' and Prof. Thorpe's 'Inorganic Chemistry.' Newth's 'Chemistry' is also an admirable book, and may be consulted with profit by the student. We shall take up for discussion each month one important point of the syllabus, and we shall be prepared to add to this any point of difficulty sent to us by our readers.

The student in practical chemistry must be well grounded in qualitative methods, as the mixtures set at the May Examination were much more difficult to negotiate than was the case in the old time. In addition, quantitative analysis, especially of a volumetric nature, must be well and soundly grasped. From time to time we shall give hints as to qualitative and quantitative work.

(*c*) Honours Stage.

For the theory examination very wide reading is necessary. We advise the student to begin by thoroughly mastering every line of the following books:—(1) Thorpe's 'Inorganic Chemistry,' (2) Tilden's 'Chemical Philosophy,' (3) Würtz's 'Atomic Theory,' (4) Muir's 'Principles of Chemistry.' In addition a good knowledge of quantitative analytic work is needed, for which we recommend the little book just issued by Messrs. Churchill, by Profs. Clowes and Coleman, or else Prof. Thorpe's well-known work on quantitative analysis (Longmans). Muir's 'Thermal Chemistry' must also be read.

In historical chemistry the 'Alembic Club Reprints,' are particulary valuable, and should be consulted. There still remains, perhaps, the most important section of all—viz., that referring to current chemical literature. This we shall endeavour to make a prominent feature of. The student who reads his 'Chemical News' carefully, week by week, will get much help under this head, and if he can obtain access to the 'Journal of the Chemical Society,' his chance of being able to meet the Department's questions on this branch will be materially increased. As to what must be attended to and what may be omitted little can be said. In the last test argon was made the peg upon which to hang Cavendish and his work upon air, and the interest lately excited by Moissan's electric furnace was responsible for a question upon the notable achievements of this admirable addition to chemical apparatus. Judging from these two instances, the Department follows the natural course of asking for details of recent work of widespread interest. If this can be relied upon as a working hypothesis, the field of labour in this particular becomes materially and gratifyingly curtailed. But the student must not take this as anything but an expression of opinion as to probability.

As to the quantitative work, nothing can be said except that the student must be prepared to spend three or four days in delicate chemical manipulation and preparation, in addition to possessing a thorough acquaintance with quantitative methods, both gravimetric and volumetric. We shall endeavour to render as much assistance as possible, but little can be done to assist except by pointing out new and approved methods. Only prolonged and careful experimentation of a varied character can win success here. The Department evidently wish to put Xp honours in the clouds, and they have succeeded but too well in accomplishing their purpose.

NOTES ON PHYSIOLOGY:

EMBRACING THE SUBJECTS OF THE ADVANCED AND HONOURS STAGES, SCIENCE AND ART DEPARTMENT.

BY WALKER OVEREND, M.A., M.D. (OXON.), B.SC. (LOND.).

Late Radcliffe Fellow, Scholar of Balliol College, and Exhibitioner in Comparative Anatomy of the London University.

The Skin as a Sense-Organ.

The whole surface of the skin is susceptible to stimuli from the outer world. The sensory nerves carry these impulses to the central nervous system, where they become sensations. Four different kinds of sensations are easily recognised—namely, touch, pain, heat, and cold.

The nerves of the skin end in several ways: (*a*) *In touch-corpuscles*, which are oval bodies, imbedded in the papillæ of the dermis, and about $\frac{1}{30}$th of an inch in length. Around each is twisted one or more nerve-fibres, and an axis-cylinder enters: but the exact manner of its termination is not satisfactorily determined. (*b*) *In end-bulbs.* These occur in the conjunctiva covering the cornea, and in the mucous membrane of the mouth. They consist of a number of large cells, in which the axis-cylinder ends. (*c*) *In Pacinian bodies.* These may be as long as $\frac{1}{20}$th of an inch—that is, perfectly visible to the naked eye. Each consists of many layers of connective tissue, arranged concentrically, like the coats of an onion, around a central space, which the axis-cylinder traverses, to end in small granular masses. These Pacinian bodies exist on the nerves of the palm and sole, also in the mesentery of the cat, and elsewhere. (*d*) *In small knobs.* Some axis-cylinders pierce the dermis, and end in the deeper layers of the epidermis in small enlargements.

(*a*) The sense of *touch* is complex—there is a sense of *locality* with that of *pressure*. This tactile or pressure sense bears intimate relations to the touch-corpuscles, since the latter occur most abundantly in those regions where this sense is most acute. By using bone-compasses, and determining the distance at which the points must be placed to be perceived as two, the *relative sense of locality* of the various parts of the skin may be estimated. The following table shows the distances of the two points of the compasses necessary to be felt as *two* distinct sensations:—

Tip of tongue	1 millimetre ($\frac{1}{24}$ inch)		
Tip of finger	2	,,	
Lip	6	,,	
Palm of the hand	12	,,	
Front of forearm	15	,,	
Forehead	25	,,	(1 inch)
Back and thigh	60	,,	(2$\frac{1}{2}$ inches)

(*b*) The *tactile* sense of the soles of the feet is particularly useful in the maintenance of *equilibrium*. In certain diseases of the spinal cord there is a diminution of sensibility in the soles of the feet, and the patient is singularly helpless when he attempts to walk in the dark. He has lost the guiding power of the eyes. In the same manner, if the skin of the soles be frozen by means of ethyl chloride, the same inability to walk exists until the effects pass off.

(*c*) *The Sense of Temperature.*—The skin can distinguish differences of half a degree (Fahrenheit). There must certainly be special nerve-endings which are capable of receiving impressions of heat and cold, because warmth and cold applied to the nerve-fibres themselves do not give rise to anything but the sensation of pain. The nerve-endings are not the same as those which receive tactile sensations, since the appreciation of differences of temperature is not so delicately developed in those situations where sensations of touch are most acute. Thus the cheeks and eyelids are much more susceptible to changes of temperature than the tips of the fingers. There are nerve-endings sensitive to heat and others sensitive to cold. If a small metallic pencil kept at 98° F., by means of a contrivance permitting a stream of warm water through it, be pressed gently against different parts of the skin of the hand, at some spots there will be no sensation except that of touch and pressure, others will feel quite hot. By using a cold pencil, cold-spots may be found which differ from the heat-spots. The skin may be thus mapped out into areas of temperature.

(*d*) *The sense of pain* may be an acute, exaggerated, tactile or temperature sensation, but it is probably quite a separate sense, and as such has a special set of nerve-fibres of its own. If we keep the pencil above 50° C., we can map out pain-spots, the topography of which is quite different from that of heat and cold. It seems probable that the endings of the nerve-fibres, within the epidermis, in small knobs, are especially connected with the sensations of heat, cold, and pain. The function of the Pacinian bodies is still problematical.

When an impulse reaches the brain it becomes a sensation. But although the perception occurs in the brain, the stimulus itself is *localised*. This power of recognising what part of the body is affected is probably the result of experience.

(*e*) *Muscular Sense.*—When the hand and arm are placed flat upon a table, keeping all muscles at rest, we can estimate the *pressure* exerted by weights placed on the palm, and so come to some conclusion as to their amount. But we can arrive at a better and truer estimate if we hold the weight in the hand and lift it up and down. We become aware of the sensation of effort, or the muscular exertion required to support it. This is the *muscular sense*, and obviously must be of a very complex nature, since sensations come from the skin, from joints, from tendons and muscles. Besides the ordinary *motor* nerves which enter the muscular fibres, there are others which form a network around the fibres, but do not penetrate them. These are *afferent* or *sensory* fibres, since they degenerate after the posterior roots of the corresponding nerves are divided. The feelings of fatigue and weariness after exertion may be due partly to the stimulation of these fibres by the products of muscular waste and tear.

The Sense of Taste.

The organs of taste are the tongue and the soft palate. The nerves of taste terminate within certain bodies, called taste-buds or goblets.

At the posterior part of the tongue are certain *papillæ*, about ten in number, called *circumvallate*, because each is surrounded by a miniature furrow or trench. Other papillæ, called *filiform*, are scattered over the tongue, especially the anterior part, and a third kind, called *fungiform*, are scattered over the middle, and are deep red. The taste-buds are scattered over the tongue and soft palate, but more particularly around the sides of the circumvallate papillæ.

Each is flask-shaped, and covered with elongated nucleated cells. In the centre lie a number of so-called *taste-cells*. They are spindle-shaped, and one fine process passes through an opening in the goblet, whilst the other descends into the substance of the tongue, and becomes connected with one of the fibres of the glossopharyngeal nerve. The sensations of taste are four in number—viz., sweet, as sugar; sour, as vinegar; bitter, as quinine; and salt, as common salt. It is thought that there are special nerve-fibres for each sensation. The nerves of the tongue are (1) the *glossopharyngeal*, which principally supplies the back part of the tongue, (2) the *gustatory* branch of the fifth cranial nerve, and (3) the *chorda tympani* of the facial, which supply the front part. Substances to be perceived as taste sensations must be dissolved. Sweet tastes are more acutely perceived by the tip of the tongue, bitters like quinine by the back part.

In what is termed *flavour* there is a blending of taste-sensations with those of touch and smell. Many of our tastes are acquired; during the process of evolution the sense of smell and the sense of touch—on the part of the tongue—are simultaneously educated. Interference with smell, such as occurs during a severe nasal catarrh, almost destroys the sense of taste. Under such circumstances the bouquet of a rich wine is lost, and its apparent excellence is unnoticed.

In all probability the gustatory fibres of the front part of the tongue enter the glossopharyngeal nerve before it reaches the brain. In the case of a tumour pressing upon the left glossopharyngeal nerve within the skull, there followed *complete loss* of taste on the left half of the tongue.

(*To be continued.*)

In addition to 'Model Answers to Honours Physiography,' we shall begin in our next number, and continue until May next, a Course of

'NOTES ON ADVANCED AND HONOURS PHYSIOGRAPHY.'

ADVANCED AND HONOURS PHYSIOGRAPHY.

I.

ANSWERS TO THE SECOND OR ADVANCED STAGE, 1896.

You are permitted to answer six questions. The two in Section I. must be attempted, and not more than one may be attempted in any other Section.

SECTION I.

21. Describe the spectrum of sunlight, and state how the spectrum is affected when the sunlight passes through water vapour.

The solar spectrum is a continuous spectrum showing numerous dark lines due to absorption. The continuous spectrum is due to the photosphere which consists of dense gases raised to incandescence. The dark lines are due to the passage of the sun's rays through the sun's atmosphere, and their appearance illustrates the principle that waves of a certain wave length and period absorb vibrations of similar wave length and period of vibration. If the atmosphere were at a higher temperature than the sun then the lines would appear as bright ones. The reverse being the case, the dark Fraunhofer lines result. Knowing the bodies giving bright lines in corresponding positions on the spectrum, it is concluded that these bodies must be present in both the sun and its atmosphere, and it is upon such evidence as this that all statements with respect to the elements present in our luminary are based.

Water vapour is not transparent to all light. Certain rays are absorbed, resulting in dark absorptive bands, the more important of which are a set in the yellow known as the rain-band, because it increases in both width and darkness as the amount of vapour in the atmosphere increases, and rain becomes more and more probable.

22. State what you know concerning the connection between the aurora and magnetic storms.

The following are the known connections between magnetic storms and the aurora :—

(*a*) Magnetic storms and exceptionally brilliant auroral displays are synchronous. The maximum effect is seen once about every eleven years—viz., when sun spots are largest.

(*b*) The aurora has been shown experimentally to be due to electric discharges in rarefied air by Professor Lemström, who covered Mt. Onatunturi in Finland with a network of wires, and found that the aurora effect was produced by the discharge of electricity through them to the earth. The exceedingly close connection between magnetism and electricity is quite sufficient to impel the belief that this synchronism between such intimately related phenomena cannot be accidental.

(*c*) The luminous beams have the direction of the dip-needle at the place where they occur.

It has long been believed that there is a causal connection between sun spots, magnetic storms, and the aurora, but Lord Kelvin inclines to the opinion that sun spots have nothing to do with either of the other two phenomena referred to.

SECTION II.

23. What has been learnt of the sun's rotation by the observation of spots ?

(*a*) It is found that spots move from east to west across the disc, thus suggesting that the sun rotates from west to east like the earth.

(*b*) The *average* time between two successive appearances of the same spot in the same position is 27½ days ; but it must be remembered that the earth from which we view the spot is revolving round the sun, which revolution must be allowed for, whence we arrive at the result that the average time of a sun rotation is about 25⅓ days.

(*c*) It is observed that there is a different period of rotation for different latitudes, the rotation being most rapid at the equator, where it is about 25 days, and least rapid about the poles, where it is about 27½ days. This is due to the fact that (1) either the spots have a proper motion of their own like cyclones, or (2) that there is really a different period of rotation for successive layers of solar substance.

(*f*) The path of a spot is variable, being straight across in an E. to W. uphill direction in December ; in June the line is still straight, but sloping W. to E. ; in March and September the path is curved. The explanation of this is that the sun's axis is inclined from the vertical, the amount of the inclination being about 7¼°.

24. Give an account of the various classes of variable stars, and the suggested causes of variability in each case.

True variables may be divided into three classes, viz. (1) those of long period, (2) those of short, and (3) those which from a maximum brightness return to one minimum, then again to the maximum, a minimum different from the first being next reached.

o Ceti, or *Mira*, is an example of the first class, and is accounted for by Lockyer on the assumption of two stars consisting of meteoric swarms have regular collisions with consequent outbursts of brilliancy.

Algol is the best known example of the second class of variable. It is accounted for by the supposition that two bodies, one luminous, the other dark, revolve round each other, with consequent eclipses when the dark body comes between the earth and the star. The following is Professor Lockyer's general statement of the causes of variability :—

Regular variability.—All regular variability in the light of conical bodies is caused by the revolution of one swarm or body round another (on the common centre of gravity).

'In the case of the revolution of one swarm round another an elliptic orbit is assumed, and the light maximum is produced by collisions among the meteorites at periastron. In the case of the revolution of a swarm round a condensed body, the light of *maximum* is produced by the tidal action set up in the secondary swarm.'

In the case of one condensed body revolving round another, the light of *minimum* is caused by the eclipse of one body by the other. This can only happen when the plane of revolution of the secondary body passes very nearly through the earth.

Irregular variability is produced (*a*) by the revolution of more than one swarm or body round another (or their common centre of gravity), or (*b*) by the interpenetration of meteoric sheets or swarms. In the case of the revolution of more than one swarm round another in elliptic orbits, the irregular maxima are caused by differences of period and periastric conditions. This accounts for the third case which is exemplified by β Lyrae.

(*To be continued.*)

NOTES ON THEORETICAL MECHANICS.

ADVANCED AND HONOURS STAGES.

BY F. CASTLE, M.I.M.E.

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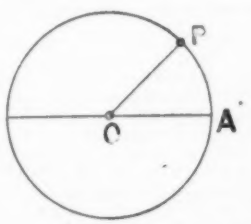
15. Masses of 5 lbs. and 11 lbs. are connected by a weightless thread ; the latter is placed on a smooth horizontal table, while the former hangs over the edge ; if the bodies are then allowed to move under the action of gravity, what is the acceleration and the tension of the thread ? Ans. 10 ft. per sec. ; 110 poundals.

Angular velocity.—When a point moves in any manner in a plane, the straight line joining it to any fixed point changes its direction. The rate at which the straight line is rotating is called the *angular velocity* of the moving point about the fixed point. The angular velocity is uniform when the straight line connecting the moving and fixed points turns through equal angles in equal times, and variable when it does *not* turn through equal angles in equal times. It is measured when *uniform* by the number of unit angles through which the moving line turns in one second (the unit angle being the radian, or $\frac{180^\circ}{\pi} = 57{\cdot}29578^\circ$); when *variable* by the number of unit angles which would have been described in one second if the angular velocity at the instant referred to were maintained constant for so long.



Perhaps the most important case to consider is when P is a point in a rigid body rotating about a fixed axis at O. All points of the

body move in circles having their planes perpendicular to, and their centres in, the axis. Hence at any instant the angular velocity is the same for all points of the body. Let V be the linear velocity of P, R the radius OP, then if w denote the angular velocity,

$$w = \frac{V}{R},$$

or the angular velocity of P is equal to its linear velocity divided by its distance.

Define the angular velocity of a moving point with respect to a fixed point. Under what circumstances will the angular velocity of the moving point be equal to its linear velocity divided by its distance? (1896.)

16. Draw a circle with centre O, and two diameters AB, CD at right angles to each other, and let the direction A, C, B, be contrary to that of the motion of the hands of a watch; produce OA to P, making AP equal to OA; let the radius of the circle be 20 ft.; suppose a particle to move along the circumference of the circle in the direction A, C, B, at the rate of 12 ft. a second; find its angular velocity with respect to O. Find also its angular velocity with reference to P, (1) when it is at A, (2) when it is at C, (3) when it is at B. (1894.) Ans. $+\frac{3}{5}$, $-\frac{3}{5}$, $\frac{3}{25}$ and $\frac{3}{15}$.

17. Define angular velocity. P is a point of a body turning uniformly round a fixed axis, and PN is a line drawn from P at right angles to the axis; if PN describes an angle of 375° in three seconds, what is the angular velocity of the body, and if PN is 6 ft. long, what is the linear velocity of P? (1892.)

$$\left(\frac{375}{3} \times \frac{\pi}{180} = \frac{25}{36}\pi = 2{\cdot}187.\right)$$

Ans. 2·187; $\frac{25}{6}\pi$ ft. per sec.

18. What is the numerical value of the angular velocity of a body which turns uniformly round a fixed axis twenty-five times a minute?

ABC is a triangle with a right angle at C; it is turning with a given angular velocity round an axis through A at right angles to its plane; find the magnitude and direction of the velocities of B and C; find also the relative velocity of B to C. (1893.)

Ans. $\frac{5\pi}{6} = 2{\cdot}618$.

19. A particle, whose mass is 3 lbs., moves uniformly in a circle; it describes the circumference 42 times a minute; find its angular velocity about the centre; and, if the radius is 14 ft., find its kinetic energy. (1893.)

Ex. 20. Draw a straight line and mark on it four points in order, A, B, C, D; let AB, BC, CD be respectively 2 ft., 1 ft., 3 ft.; suppose a particle to be at C moving at right angles to AD at the rate of 4 ft. a second; find its angular velocity with reference to A, B, and D respectively. In what respects does the angular velocity with reference to A differ from the angular velocity with reference to D? (1894.) Ans. $-\frac{4}{3}$, -4, $+\frac{4}{3}$.

Velocity of a moving point is its *rate of motion*, or rate of change of position, and may be either *uniform* or *variable*; it is said to be uniform when equal distances are passed over in equal intervals of time, and is measured by the distance described in one second; distances are usually expressed in feet or metres per second, except when the velocity is very great, as in the case of light, and the measurement may then be made in miles per second.

When the velocity is *variable*, that is, when unequal distances are passed over in equal intervals of time, the measurement is made at each instant by the distance which the body would describe in one second, if for such a period it kept its velocity unchanged.

Hence when a body is moving uniformly with a velocity v for a time t, if s be the space described, then $s = vt$.

If the space described in any interval of time be divided by the time, we obtain the *average velocity*; thus in variable velocity, if v denote the velocity during any interval t, the *average velocity* will be $v = \frac{s}{t}$, s being the space described during the interval, and this may be made as accurate as possible by taking the time interval very small; usually the velocity is increasing or diminishing at a uniform rate, and the average velocity is taken to be the arithmetical mean of the velocity at the beginning and at the end of any interval of time t.

Acceleration is the *rate of change of velocity*, and may be either uniform or variable; when uniform, the velocity is increased or diminished by equal amounts in each second; thus when a body is moving at 8 ft. per sec., if at the end of 1.2.3 ..... seconds the velocity is found to be 12, 16, 20 ..... ft. per sec., this would correspond with a uniform acceleration of 4 ft. per sec. in each second, and would be written 4 ft. per sec. per sec.

If the initial velocity of the body be V ft. per sec., and f denote the uniform acceleration, the velocity of the body at the end of 1.2.3 seconds would be $V + f$, $V + 2f$, $V + 3f$; and the velocity of the body at the end of any interval of time t would be $V + ft$, (1).

If the action be to reduce the motion of the body, or retardation instead of acceleration take place, it is only necessary to alter the sign of f in eq. (1), and the velocity would be $v = V - ft$.

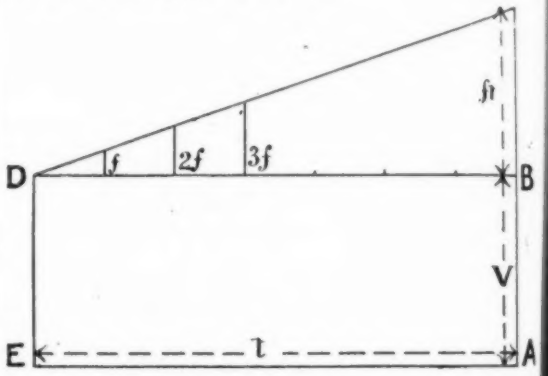
21. The velocity of a body is increased uniformly in each minute of its motion by 66,000 yards a minute; by how many feet a second is its velocity increased in each second? If the acceleration of a body's velocity, due to the action of a certain force, is 55 in feet and seconds, what is it in yards and minutes? Ans. 55; 66,000.

$$\left(\frac{66000 \times 3}{60 \times 60} = 55, \text{ etc.}\right)$$

22. The velocity of a body is increased by 12,000 yards a minute in each minute of its motion; by how many feet a second is its velocity increased in each second of its motion?

Ans. 10 ft. per sec.

The final velocity v can be shown graphically by a line AC, where AB = V, and BC = ft, $\therefore$ AC = $V + ft$.



The space s described, being the average velocity multiplied by the time, may be represented by the area of the four-sided figure ACDE, where EA denotes the time t, and AC denotes $V + ft$; the area of ACDE is the area of the rectangle ABDE, together with the area of the triangle BCD, $\therefore s = Vt + \frac{1}{2}ft^2$. (2)

In a similar manner when the acceleration f is negative, the area of the triangle would be substracted, $\therefore s = Vt - \frac{1}{2}ft^2$.

(*To be continued.*)

MATHEMATICS.

STAGES 2 AND 3, SCIENCE AND ART DEPARTMENT.

BY G. A. BAXANDALL,

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STAGE 2.

Algebra.

Equations involving Surds.

Read—Arts. 318 to 322 H.S., *or* 281, 282 H.K.

In connection with this type of equation there is one important point which is referred to in the latter text-book, but not in the former. Take the equations—

$x + \sqrt{5x + 10} = 8$ (1), and $x - \sqrt{5x + 10} = 8$. (2)

By transposing in each we obtain—

$\sqrt{5x + 10} = 8 - x$, and $-\sqrt{5x + 10} = 8 - x$.

Now square, and from each we get—

$5x + 10 = 64 - 16x + x^2$, or $x^2 - 21x + 54 = 0$, (3)

from which $x = 18$ or 3. Now, although both 18 and 3 satisfy equation (3), we ought not to expect that one or both of these values should *necessarily* satisfy (1), for (3) is not *necessarily* derived from (1), it may, as we have seen, be derived from (2). As a matter of fact we have to make a trial, on which we find that 3 satisfies (1) while 18 satisfies (2). The student should therefore remember that in solving an equation similar to (1), if both sides be squared, the

one or *both* or *neither* of the values found from the resulting quadratic may satisfy the original equation on a trial being made. Also of values thus found, those which do not satisfy the given equation will satisfy an equation allied to it in a manner similar to that in which (2) is allied to (1).

Work exercises selected from Exs. cxix., cxx., cxxi. and cxxii. H.S., *or* from Exs. XXXI.*g* and XXXI.*h* H.K. Also the following—

20. Solve the equations—

(1) $x - 6\sqrt{x+3} + 12 = 0$.

(2) $3x + \sqrt{30x - 71} = 5$.

(3) $3x + \sqrt{2x - 2} = 7$.

(4) $x^2 - 3x + 6\sqrt{x^2 + 7} = 0$.

(5) $x^2 - 2x + 6\sqrt{x^2 - 2x + 5} = 11$. Write this in the form $x^2 - 2x + 5 + 6\sqrt{x^2 - 2x + 5} = 16$; put $\sqrt{x^2 - 2x + 5} = y$ and first solve $y^2 + 6y = 16$.

(6) $\sqrt{x} + \sqrt{x - \sqrt{1 - x}} = 1$.

Ans. (1) 6; (2) No values given by ordinary method; (3) $1\frac{8}{9}$; (4) ± 3; (5) 1; (6) $\frac{16}{25}$.

Miscellaneous Examples—

21. If $ax^2 + bx + c$ becomes 42 when $x = 4$, 22 when $x = 3$, and 8 when $x = 2$, what are the values of a, b, c?

Ans. $a = 3$; $b = -1$; $c = -2$.

22. Show that $x + \frac{1}{x}$ cannot be less than 2 whatever positive value be substituted for x.

23. A shopkeeper, on account of bad book-keeping, knows neither the weight nor prime cost of a certain article which he had purchased. He only recollects that if he had sold the whole at 30s. per lb. he would have gained £5 by it, and if he had sold it at 22s. per lb. he would have lost £15 by it. What was the weight and prime cost of the article?

Ans. 50 lbs.; 28s. per lb.

Trigonometry.

Read the articles contained in Chap. XV. H.S., *or* in Chap. XV. Lock, and observe that the same method is applied in working all the examples contained in the former Chapter.

Work a number of exercises from each set of examples in one or the other of the Chapters just named.

Work the following examples, in which the necessary logarithms are to be taken from 'Chambers's Mathematical Tables,' or from any other source where the logarithms are carried out to 7 places of decimals:—

36. Write down the powers of 4 as far as the seventh, and determine the characteristics of the logarithms of 972, 1025, 15280·6 to base 4. Ans. 4; 5; 6.

37. Find the value of $\sqrt[4]{\frac{132 \times (7{\cdot}356)^9}{\sqrt{(3{\cdot}25)^5}}}$. Ans. 144·35.

38. If L sin 33° 14′ = 9·7388201, find the values of L cosec 33° 14′ and L cos 56° 46′. Ans. 10·2611799; 9·7388201.

39. Find the value of $\frac{3}{5} \cdot \frac{\sin 48° 12'}{\tan 22° 34'}$ by the use of logarithms.

Ans. 1·0763.

40. Show that—

L cos 32° 14′ 55″ = 9·9272372. L sin 15° 16′ 17″ = 9·4206015.

L cosec 130° 29′ 30″ = 10·1189005. L sec 314° 46′ 20″ = 10·1522484.

41. Find the value of A if L sin A = 9·2461792, and of B if L cot B = 9·8765432. Also find the value of C if $\sin \frac{C}{2} = \sqrt{\cdot 125}$. What is the value of $\sqrt{\sin 22° 35' 20''}$?

Ans. 10° 9′ 9″·3; 53° 2′ 10″·4; 41° 24′ 32″·8; ·72692.

STAGE 3.

Algebra.

Read the chapter on the 'Theory of Quadratic Equations' in Todhunter, or Hall and Knight.

Work the following examples:—

32. If α and β are the roots of $x^2 + px + q = 0$, show that $\alpha^3 + \beta^3 = p(3q - p^2)$.

33. If the roots of $x^2 - px + q = 0$ are two consecutive integers, prove that $p^2 - 4q - 1 = 0$.

34. Show that $x + \frac{1}{x}$ cannot be less than 2, whatever positive quantity be substituted for x.

35. If a proposed equation be reduced to the form $ax = ax + c$, what conclusion is to be drawn as to the value of x?

36. What must be the value of m if $2x^2 + 3y^2 + 7xy + 4x + my + 2$ be resolvable into two rational factors? Ans. 7.

37. If $x^2 + 5x + 4$ and $x^2 + mx + n$ have a common factor, show that $(n - m + 1)(n - 4m + 16) = 0$.

38. If x be real, prove that $\frac{x^2 + 34x - 71}{x^2 + 2x - 7}$ can have no real value between 5 and 9.

39. Find the greatest value of $\frac{x+2}{2x^2 + 3x + 6}$ for real values of x, and show that $\frac{4x^2 + 4x - 3}{6(2x+1)}$ cannot have either a maximum or a minimum value. Ans. $\frac{1}{3}$.

Trigonometry.

There are two series which prove to be very useful in working a certain type of example which is frequently to be met with in this section. One is a series of sines and the other a series of cosines, the angles in each case being in arithmetical progression. The sum of each series will be found in Todhunter, Chap. XXII., and in Loney, Chap. XXIX.

We do not, however, recommend the student to try to remember these sums, but to remember to multiply any such series by 2 sin (half the common difference of the angles), then to make one change, when the sum can be easily obtained. For example, suppose we require to sum the series—

$\cos\theta + \cos 3\theta + \cos 5\theta$ ..... to 6 terms. (1)

We must multiply each term by $2 \sin\theta$, thus obtaining—

$2\sin\theta\cos\theta + 2\sin\theta\cos 3\theta +$ ..... $2\sin\theta\cos 11\theta$. (2)

Now $2\sin\theta\cos\theta = \sin 2\theta$,

$2\sin\theta\cos 3\theta = \sin 4\theta - \sin 2\theta$,

... ... = ...

$2\sin\theta\cos 11\theta = \sin 12\theta - \sin 10\theta$,

Hence, Series (2) = $\sin 12\theta$.

$\therefore$ Series (1) = $\frac{\sin 12\theta}{2\sin\theta}$.

Since $\sin^2\theta = \frac{1}{2}(1 - \cos 2\theta)$ and $\cos^2\theta = \frac{1}{2}(1 + \cos 2\theta)$, it follows that the series—

$\sin^2\theta + \sin^2(\theta + \alpha) + \sin^2(\theta + 2\alpha) +$ .....

$\cos^2\theta + \cos^2(\theta + \alpha) + \cos^2(\theta + 2\alpha) +$ .....

may be reduced to the standard series of cosines referred to above.

Work the following examples—

31. Show that $\cos\alpha + \cos 3\alpha + \cos 5\alpha +$ ..... $\cos 15\alpha = \frac{1}{2}$, if $17\alpha = \pi$.

32. Show that—

$$\cos\frac{\pi}{16} + \cos\frac{3\pi}{16} + \cos\frac{5\pi}{16} + \cos\frac{7\pi}{16} = \frac{1}{2}\operatorname{cosec}\frac{15\pi}{16}.$$

33. Find the sum of the straight lines drawn from any one of the angular points of a regular polygon of n sides to each of other angular points, the length of the side of the polygon being $2a$.

Ans. $a \operatorname{cosec}^2 \frac{\pi}{2n}$.

Other examples will be found in connection with the chapters named above.

Euclid.

1. Let A be the centre and AB a radius of a given circle; in AB take any point C, and on AB produced find a point D, such that CA . AD = AB²; through C draw any chord, PCQ; show that a circle will pass through the points A, P, D, Q.

2. If a quadrilateral be inscribed in a circle, show that the square on the straight line joining the points of intersection of opposite sides is less than the sum of the squares on the straight lines joining those points to the centre of the circle by twice the square on the radius of the circle.

Hence show that if one pair of opposite sides of a quadrilateral inscribed in a circle intersect at a fixed point, the other pair of opposite sides will intersect on a fixed straight line.

MAGNETISM AND ELECTRICITY.

SCIENCE AND ART DEPARTMENT EXAMINATION IN MAGNETISM AND ELECTRICITY.—2ND STAGE.

BY EDWIN EDSER, A.R.C.S.,

Mathematical Lecturer and Physical Demonstrator, South Western Polytechnic, late Assistant in the Physical Laboratory, Royal College of Science.

MAGNETISM—*cont.*

4. How would you determine the distribution of magnetism in a magnet?

Answer.—The distribution of magnetism in a magnet may be determined by setting the magnet vertical, and placing a small magnetised needle suspended by a fine filament at various points close to the magnet, and noting the time of oscillation at each point. If σ = surface density of magnetism at any point, then at a short distance from that point the number of lines of force proceeding normally from the magnet will be $4\pi\sigma$. Also, the time of oscillation of the magnetized needle will vary inversely as the square root of the force; hence the surface density of electricity on the magnet at various points will vary inversely as the square of the time of oscillation of the needle.

Suppose, for instance, that at the point occupied by the magnetized needle the force due to the magnet is augmenting the earth's horizontal component, and that in the earth's field the needle completes one oscillation in two seconds, whilst at the particular point near the magnet one oscillation is completed in one second; then

$$\frac{4\pi\sigma + H}{H} = \frac{2^2}{1} = 4;$$

$$\therefore \frac{4\pi\sigma}{H} = 4 - 1 = 3;$$

$$4\pi\sigma = 3H.$$

If the value of H, the earth's horizontal component, be known, the value of σ at any point can be determined.

FRICTIONAL ELECTRICITY.

5. A Leyden jar standing on an insulating stool is electrified by a machine, while its outer coating is touched by the knob of an exactly similar Leyden jar held in the hand. The first jar being now disconnected from the machine, it is taken in the hand either (1) by its outer coating and presented with its knob to that of the second jar, or (2) by its knob and presented with its outer coating to the knob of the second jar. Does a spark pass in either case? Explain the action.

Answer.—Let us suppose that the internal coating of the first jar is charged positively by the electrical machine. Then a negative charge will be attracted and a positive charge repelled on the outer coating; when the knob of the second jar is presented to the outer coating of the first, the positive charge will flow into the second jar, whilst an equal positive charge will be repelled from its outer coating and pass to earth through the hand holding the jar. Both jars will now have their internal coatings charged positively, and their external coatings charged negatively; and since the jars are similar (*i.e.* their capacities are equal), the difference of potential between their inner and outer coatings will be equal.

(1) If the first jar be now disconnected, and, being held by the other hand of the experimenter, presented with its knob to the knob of the second jar, no spark will pass; for the outer coatings of both jars being connected through the body of the experimenter will be at the same potential, and the difference of potential between the inner and the outer coatings being the same in both cases, the inner coatings will be at the same potential also.

(2) If the knob of the first jar is connected through the body of the experimenter with the outer coating of the second jar, whilst the outer coating of the first is presented to the knob of the second jar, then the positive charge on the inner coating of the first jar will combine with the negative charge on the outer coating of the second, the positive charge on the inner coating of the second jar similarly combining with the negative charge on the outer coating of the first jar. As the charges are equal they will entirely neutralize each other, and after the passage of the spark both jars will be completely discharged.

6. Two equal horizontal metal discs A and B are placed symmetrically one over the other and separated by air, A being insulated and B earth connected. When A is charged the plates attract each other. Will the attraction be the same when the space between them is filled with paraffin? Give reasons.

Answer.—When the plate A is charged, say, with a surface density of electricity = σ, $4\pi\sigma$ lines of force will pass from each square centimetre of its surface to earth. On the second earth-connected plate being placed near A, practically all of these lines of force will pass to it, and the contraction of these lines of force will tend to draw the plates together.

On the paraffin being placed between the plates, the number of lines of force is not altered, since the charge on A remains the same as before; but the contractile strength of each line of force will be reduced to $\frac{1}{K}$ of its former value, K denoting the specific inductive capacity, or dialectric constant of paraffin; and since this is greater than one, the attraction between the two discs will be diminished.

Or looked at slightly differently, the introduction of the paraffin will increase the capacity of the condenser formed by the two plates, and the quantity of electricity remaining constant the potential difference between the two plates will be diminished. Consequently the attractive force between the plates, which will vary as the square of the potential difference between them, will be diminished.

7. State and explain the action of Lord Kelvin's Replenisher.

Lord Kelvin's Replenisher consists of two metal half-cylinders, a, a', separated by narrow air-spaces; inside of these are two metal carriers b, b', which are insulated from each other and attached to an ebonite rod R by which they can be rotated. The half cylinders have small holes c, c', through which springs pass to such positions that they will be touched by the carriers as they rotate. Each spring is electrically connected with the half-cylinder through which it passes. Two other springs d,d', pass through the narrow air space between the cylinders, and are electrically connected with each other.

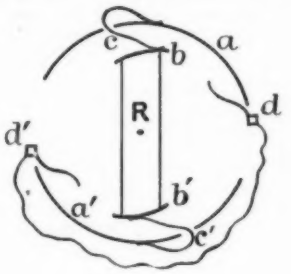

FIG. 4.

To explain the action of the replenisher, suppose that a has a small initial positive charge, a' being connected to earth; then when the carrier b moves up to d, it will be charged negatively by induction, b' being charged positively; on a further rotation, the charge on b will be communicated to earth, whilst the positive charge on b' is communicated to a, through contact with the springs passing through c', c, respectively. Thus the + charge on a will be increased, and the process can be carried on continuously.

8. An insulated ice pail and an insulated brass ball are both charged with positive electricity at a distance from each other, the pail to a high potential, the ball to a low potential.

The ball is then brought near to the pail and lowered into it without touching it, till the bottom is reached. After contact the ball is entirely removed. Describe the changes in the potential both of ball and pail (1) before contact, (2) on contact, (3) after removal.

Answer.—The charged ice pail must be considered as a hollow charged conductor. Since the force inside such a conductor is everywhere zero, the potential of every point inside must be the same, and equal to the potential on the surface of the ice pail.

(1) The ball is charged to a low potential (*not* a negative potential), therefore as it is brought up to the ice pail, the potential of the latter, and therefore that of every point in its interior, will be increased. When the ball is introduced into the ice pail, the potential of the ball will be that due to its own charge added to the potential of the interior of the ice pail. Also, the potential of the ice pail will be heightened by the presence of the electrified ball in its interior.

(2) On contact electricity will flow from the ball to the ice pail since the former is at a higher potential than the latter. The potential of the ball and ice pail will now be equal, and the same as the potential of the ice pail when the ball was at its centre. This is self evident if we consider the ice pail to approximate to a spherical form, for then the effect of electricity on its surface will be the same as if it were condensed at its centre. If the ice pail is not spherical, a slight correction would have to be made.

(3) As the ball is removed, no alteration will take place till it is outside the ice pail, when the potential of the latter will be slightly diminished owing to the increase of the capacity of the system. As the ball is removed to a distance, the potential will increase to the value it had when the ball was inside. The potential of the ball will be that of the point in space that it occupies, due to the electricity on the ice pail. At an infinite distance its potential will be zero.

(*To be continued.*)

SCIENCE NOTES.

POISONOUS HONEY.—Some investigations undertaken by L. F. Kebleo into cases of poisoning by honey at Princeton, New Jersey, point to the probability that the toxic principle is derived from certain species of Ericaceæ, many of which contain a potent poison, *andromedotoxin*. No traces of alkaloids, or of any inorganic poison could be detected in an alcoholic extract of the honey administered for the purpose of experiment to cats, while there were indications of the presence of andromedotoxin, though not sufficiently definite to justify a positive statement.

***

THE COLOURING MATTERS OF PLANTS.—L. Weigert has recently been classifying the colouring matters of plants. He is of opinion that there are two well-marked classes of red pigments in the vegetable kingdom, the wine-red and carrot-red. The wine-red occurs in the Virginian creeper, in *Rhastyphina*, *Cornus sanguinea*, etc.; the carrot-red in the fruit of *Phytolacca*, in the beet, and in *Amaranthus*, *etc.* Another group is formed by the mallow-violets, as in *Coleus*, etc. In black grapes and in whortleberries there are two pigments, one of which is a glucoside. Both appear to belong to the class of tannins. The colouring matters of yellow vine-leaves and of the flowers of the mallow are apparently both glucosides.

***

SALTS OF SORREL AND PÂTÉ DE FOIE GRAS.—The indigestibility of *pâté de foie gras*, according to M. Peres, is due to the presence of acid oxalate of potassium in the goose livers which are the basis of the *pâté*. The custom has gained ground for the farmers to mix a little powdered salts of sorrel in the food with which they cram the geese. The result of this admixture is a rapid enlargement of the liver. In one case an overdose of the salts caused the death of the bird. This practice of mixing salts of sorrel with the food is said to be kept strictly secret by the farmers who adopt it, since it enables them to obtain larger livers with less trouble and in a shorter time than under the old system of feeding.

***

TELEPHONES AND DEAFNESS.—A new arrangement of the telephone, termed by its discoverer the *lamprophone*, has been introduced by Mr. B. Thornton to enable deaf people to hear. The complete apparatus comprises a pair of telephones fitted with appropriately shaped handles, and a battery of three dry cells. With the lamprophone an intensification of the voice is produced equal to the best form of ear trumpet, at a distance of from six inches to a foot from the mouth of the transmitter. When the mouthpiece is approached to within two or three inches the sound is so much marked as to be distressing to some deaf mutes. At a distance of a foot from the transmitter's mouth some of the 'best hearing children' found no difficulty in hearing sentences of familiar words spoken in a conversational tone, though the speaker was inside a room and the patient outside with the door shut. The receiver is held close to the listener's ear. The sound of the speaker's voice is consequently reproduced opposite to and within an inch and a half of the tympanic membrane, and as the sound waves are thus confined to the external meatus there is no loss by radiation.

DYE FROM ONIONS.—Onion skins have for a long time been used for dyeing Easter eggs. A. G. Perkin and J. J. Hummel have now discovered that it is possible to dye textile fabrics in the same manner. *Quercitin*, the colouring matter contained in the outer skin of the onion, together with an aluminium mordant dyed calico a bright yellow, and with iron a dark olive. Samples of wool, mordanted with chromium, aluminium, tin, or iron, when heated with quercitin came out brownish olive, yellow, bright orange, or greenish olive respectively. Quercitin also exists in quercitin bark, Persian berries, catechu, tea-leaves, apple-tree bark and horse-chestnut bark.

***

A NEW FILTER.—Potterin finds that a very inexpensive and efficacious substitute for the expensive and fragile biscuit porcelain tubes, used in the Pasteur and other filters, is made by filtering media prepared from cellulose. Fibres of cellulose are finely powdered and sifted, then suspended in water so as to form a paste, which when slowly dried forms plates some milimetres thick. So inexpensive are they that it is cheaper to replace them by new ones than to clean porcelain tubes.

***

THE PHYSIOLOGY OF COLOURED LEAVES.—Dr. E. Stahl has recently made some interesting investigations with the colouring matter of coloured leaves which he calls *erythrophyll* rather than *anthocyan*. Although many rodents and ruminants show a preference for green leaves, he considers it certain that the colour is a protection against insects or snails. The main purpose of the colouring matter he considers to be concerned with the process of transpiration. The absorption of the rays of light by erythrophyll is complementary to that by chlorophyll. The absorption of the red rays is advantageous to the plant by raising its temperature. This elevation of temperature Dr. Stahl determined by experiment. The red pigment then is concerned in promoting the process of metastasis. Its frequent occurrence in the stigmas of entomophilous plants probably assists the formation and growth of the pollen tubes. Erythrophyll never occurs in the guard-cells of the stomata, where a low temperature is favourable in order to increase the turgor of the cells and hence promote the opening of the stomata.

***

RECENT TELEPHONIC EXPERIMENTS.—Some remarkable telephonic experiments have been recently made in Russia. Keldushoffsky's new telephone has conveyed messages and songs between Moscow and Kostov on the Don, a distance of 600 miles. The wire used was over 1800 miles long. Keldushoffsky will shortly visit England with the view of ascertaining whether telephonic messages cannot be conveyed from England to America by means of the transatlantic cable by his method.

***

A NEW USE FOR CARRIER PIGEONS.—A new employment for carrier pigeons has been devised by a Scotch doctor. When visiting patients at a great distance from his home he carries some carrier pigeons with him, and after writing a prescription for an urgent case immediately despatches it home by means of one of the birds. The medicine is thus delivered sooner. Another course he adopts is to leave a pigeon at a patient's house, in case of need it is liberated and flies home to tell the doctor that his presence is required.

***

THE LIQUIFICATION OF THE CELL WALL IN PLANTS.—Herr Schellenberg has recently conducted some interesting investigations with the question of the liquification of the cell wall in plants. He is of opinion that the strength of different kinds of wood does not depend in the degree of liquification of the cell walls, nor does the latter determine either the extensibility nor the power of absorption by the wood. Liquification invariably takes place while the cell still contains protoplasm. He considers the purpose of liquification to be neither the conduction of water, nor the increase of firmness, but the stoppage of growth in order that the part of the plant may permanently retain the form it has acquired.

We shall have pleasure in forwarding, post-free, to any Subscriber, a complete set of Solutions to Mr. Workman's 'Arithmetic Prize Papers' upon receipt of a post card addressed to the Office of this Journal.

REPLIES TO SCIENCE QUERIES.

T.C.—Yes, answer in Science Section to Stage 2 Algebra, No. 16, should read 'a' instead of $\frac{1}{a}$ as given.

T.M. (*R.U.I.*).—Hall & Knight's Higher Algebra (Macmillans, 7s. 6d.) will answer your purpose, especially as there is a key published at 10s. 6d. Higher Trigonometry by Lock (Macmillans, 4s. 6d.) is the book we recommend. Loney's Plane Trigonometry (Cambridge University Press) is also an admirable book. The best Logic for examination purposes is undoubtedly that of Welton (U.C.C.), because of the prominence given therein to the views of the best writers on the subject, and of the clearness of the exposition. If you require a book merely to supplement yours, then we recommend Minto's Logic (Murray), wherein is to be found an admirable outline history of induction. Send your examination papers, and if upon reflection we think a short article thereupon likely to please our readers, it shall be supplied. We wish you success in your next venture, and thank you for your kind words *re* 'PRACTICAL TEACHER.'

E.W.P.—The two air pumps in question are the single-barrelled and double-barrelled varieties. You will find them figured in any work on Pneumatics and Hydrostatics. See p. 188, Glaze-Brook's Hydrostatics, or p. 182, Deschanel's Natural Philosophy.

Science.—

(1) (*a*) S. G. of glass = 2·5.
(*b*) S. G. of air = ·0012.
(*c*) S. G. of system in question = 1.
Excess of (*a*) over (*c*) = 1·5.
Deficit of (*b*) under (*c*) = ·9988.
∴ Volume of air in glass compared with the volume of the glass itself = $\frac{1\cdot5}{\cdot9988} : 1 = 1\cdot5018\ldots\ldots : 1$ and $\frac{1}{1\cdot5018}$ = fraction of the bulb consisting of glass.

(2) Proportion by weight of oxygen to X (the unknown element) = 2 : 3.
Atomic weight of X is known from Dulong and Petit's law of Atomic Heat :—
Sp. Ht. × At. Wt. = 6·4.
·25 × At. Wt. = 6·4 ; ∴ At. Wt. = 25·5.
At. Wt. of oxygen = 16.
Now $\frac{40}{16} = 2\cdot5$;
and $\frac{60}{25\cdot5} = 2\cdot4$ nearly, *i.e.* practically 2·5.
∴ Formula of oxide = XO, X_2O_3, or some such expression, where the number of atoms of X = the number of atoms of O.

J.H.F. (*Fluids*).—Elementary Mechanics of Solids and Fluids, Selby (Clarendon Press), 7s. 6d.

R.W.T.—Yes, it is quite possible. Building Construction, by Edward J. Burrell (Longmans), 2s. 6d.

W.L.—Everett's Vibratory Motion (Longmans), Stone's Sound (Macmillans), Catchpool's Sound (U.C.C.), and Deschanel's Sound (Blackie), are all good books. Tait's Light (Black), Heat by Weight in Longman's Advanced Science Series.

Docco.—You may sit for the examination as a private student, but your attendances at a class could not be counted. See Science Directory for 1896.

R.W.R. (*Barnsley*).—If you refer to pages 46–7 of the new Science Directory, you will find that your choice of subjects has been very materially curtailed. In accordance with footnote on p. 47 we have no doubt but that the Department will accept your successes as 'Qualifying Subjects,' probably for either Group A or B. If so, B will suit you best, but you will have to substitute Mathematics for Geology, and Organic Chemistry for the Mechanics of Solids and Fluids. If you still intend to compete, please write again, stating which Group you propose competing under, and a list of books shall at once be supplied by post.

J. B. Baylis ; Physics ; E.C.—Replies next number.

REVIEWS.

The Rickerton Medal. By Skelton Kuppord. London: The Religious Tract Society.

To this story attaches more than ordinary interest, because it is a book for boys, written by one who knows and admires the apple-eating genus. Moreover, it is a story intended for the elementary school boy, hence the sub-title, 'Tram Street, Standard VI.' From start to finish the tale is one of action, and of action well within the comprehension of the juveniles for whom the author intends his work. We are introduced to a School Board member with a silvern speech, not of the kind which is inferior to silence, seeing that it is a medal of sterling silver to be given to the dux of Tram Street School, which Mr. Rickerton, the School Board member in question, presents to the assembled scholars, instead of the usual prize-day speech, which he has the *nous* to recognise as nothing short of a penance for the youngsters to undergo. Then comes the introduction of the scholar James Cameron, who seems destined to win the coveted medal, until pale-faced Willie Rollo comes on the scene and materially alters the complexion of affairs. How he does this, how he ranges from dux to doobie, and how finally two medals are provided, one for James and one for Bill, must be learnt from a perusal of the story, and we shall be greatly mistaken if all boys into whose hands the book falls do not imitate us in swallowing it all at a single sitting. Skelton Kuppord has wisely abstained from portraying his characters as angels. Nobody will value Willie the less because he screwed his courage up to the sticking point and hurt his knuckles in enlarging Nielie's nose ; and surely no boy will refrain from admiring Doddy, albeit on occasion he was equal to truanting. We have said enough to show what sort of a tone prevails throughout 'The Rickerton Medal,' so we will take our leave of the story in hoping that the readers of 'The Rickerton Medal' will be many, and that their profit will be as great as the genial author so evidently wishes and intends it to be.

GEOGRAPHICAL TEXT-BOOKS AND READERS.

Man on the Earth: a Course in Geography. By Lionel W. Lyde, M.A. London: Blackie & Son, Limited.

Man and his Markets: a Course in Geography. By Lionel W. Lyde, M.A. London: Macmillan & Co., Limited.

Though published by different educational publishing firms and issued in rather different forms, Mr. Lyde's two courses of geography are companion volumes. The author has adopted in each case a strikingly rational and practical method of presenting his subject. He gives us no mere classified lists of names, nor tables of heights, lengths, and distances ; but in a series of thoroughly readable chapters he groups the facts he wishes to teach so as to show clearly their mutual relations, and so that the student may be able to see the practical bearing of the conclusions to be drawn from them on industrial and commercial life.

The course 'Man on the Earth' opens with a chapter on *Population*, in which the geographical conditions which determine the density and character of the population of different parts of the earth are set forth in a most interesting fashion, and illustrated aptly and abundantly. Succeeding chapters deal in the same way withClimate, Mountains, Rivers, Transport by Water and by Land, Commercial, Political, and Historical Geography.

The second course begins with an extremely interesting chapter on *Environment*, which forms a counterpart to that on Population. Then follows a delightful chapter on the *Birth of a City*. The remaining chapters have a distinctly economic bearing, and treat of such subjects as Bread and Milk, Flesh and Fish, Coal and Iron, Cotton and Wool, and Some Important Markets.

In both books Mr. Lyde insists on the necessity for the practical application of geographical and technical knowledge in commercial life if our countrymen are to maintain their supremacy in the world's markets.

The pictorial illustrations are numerous and excellent in both volumes.

Dr. Green's 'Lessons in Zoology,' Miss Dodd's 'Lessons for Criticism Classes,' and Mr. Elderkin's series of 'Composition Themes,' will be continued in our November number.

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Macmillan's Geography Readers. Book VII., The United States, Ocean Currents and Tides. Book VI., The Colonies of Great Britain. Book V., The Countries of Europe. London: Macmillan & Co.

These first issued numbers of a new series of reading books on geography are among the most interesting school books that it has been our good fortune to review. Instead of a dry compilation of geographical facts in the form of a 'reader,' we have here graphic descriptions of places and people, with sufficient explanatory matter to make the whole perfectly clear to a child of average intelligence.

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Longmans' Geographical Series. Book I., The Child's First Book of Geography. London: Longmans, Green, & Co.

From the short preface to 'The Child's First Book of Geography,' we learn that this is the first of a new series of five geographical books on a rather novel plan. The first three are arranged on the concentric system—that is, they traverse the same ground with increasing attention to matters of detail. With the first only before us, we are able to say that the outline of the course is admirably set forth. The first six chapters deal generally with the world and its physical features, and are very effectively illustrated. Two or three relief views of the basin of the Ouse and the Lake District are remarkably good. The rest of the volume treats briefly but very clearly of the various parts of the world—the British Isles and the principal countries of Europe somewhat more fully than more distant countries.

The most striking feature, however, is the capital series of maps, which number more than fifty. About one-fourth of these are beautifully executed relief maps, which have the delicate shading of a good photograph, while the remainder are good colour-printed maps, many of them full-page, and others given in the text. In the physical maps, variety of surface is indicated by difference of tint. Only those places are marked and named that are mentioned in the text, and so the maps are free from the confusion caused by crowded names. Perhaps the sparseness of names is carried in some cases to the extreme. For instance, in a full-page map of Switzerland, *Bern* is the only name shown within the borders of the country.

We ought to add that the book is not a 'reader,' but a text-book for beginners, and that it is specially suited for the junior forms of middle-class schools.

Practical Method of Class Management. By F. W. Hackwood. London: G. Philip & Son.

This little book, which does not aim to be a complete manual of teaching, is, nevertheless, a most useful work to place in the hands of young teachers. The advice and hints given are thoroughly good, and should give some insight into the theory which underlies all education.

Exercises on Voice Production and Enunciation. By Ralph Dunstan. London: Westminster School Book Depôt.

All those who wish to improve their voice for public reading or speaking should consult this little work of Dr. Dunstan. He provides vocal gymnastics of every possible kind, with a wealth of directions and exercises, and takes his pupil through a complete course. To the average reader the contents will come as a surprise—surprise at his own ignorance as to what his voice should and could be. We hope, for the sake of all audiences, that all speakers will go steadily through the treatment here provided.

The Day by Day Arithmetic. Part V. By T. B. Ellery. London: Jarrold & Sons.

This is another of Mr. Ellery's well-known class-books, containing exercises on G.C.M., L.C.M., Fractions, Practice, Bills of Parcels, Decimal Coinage, with miscellaneous problems and test cards. The whole is thoroughly good.

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William I., German Emperor, and his Successors. By Mary Cochrane.

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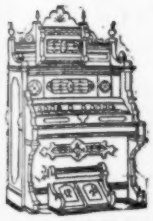

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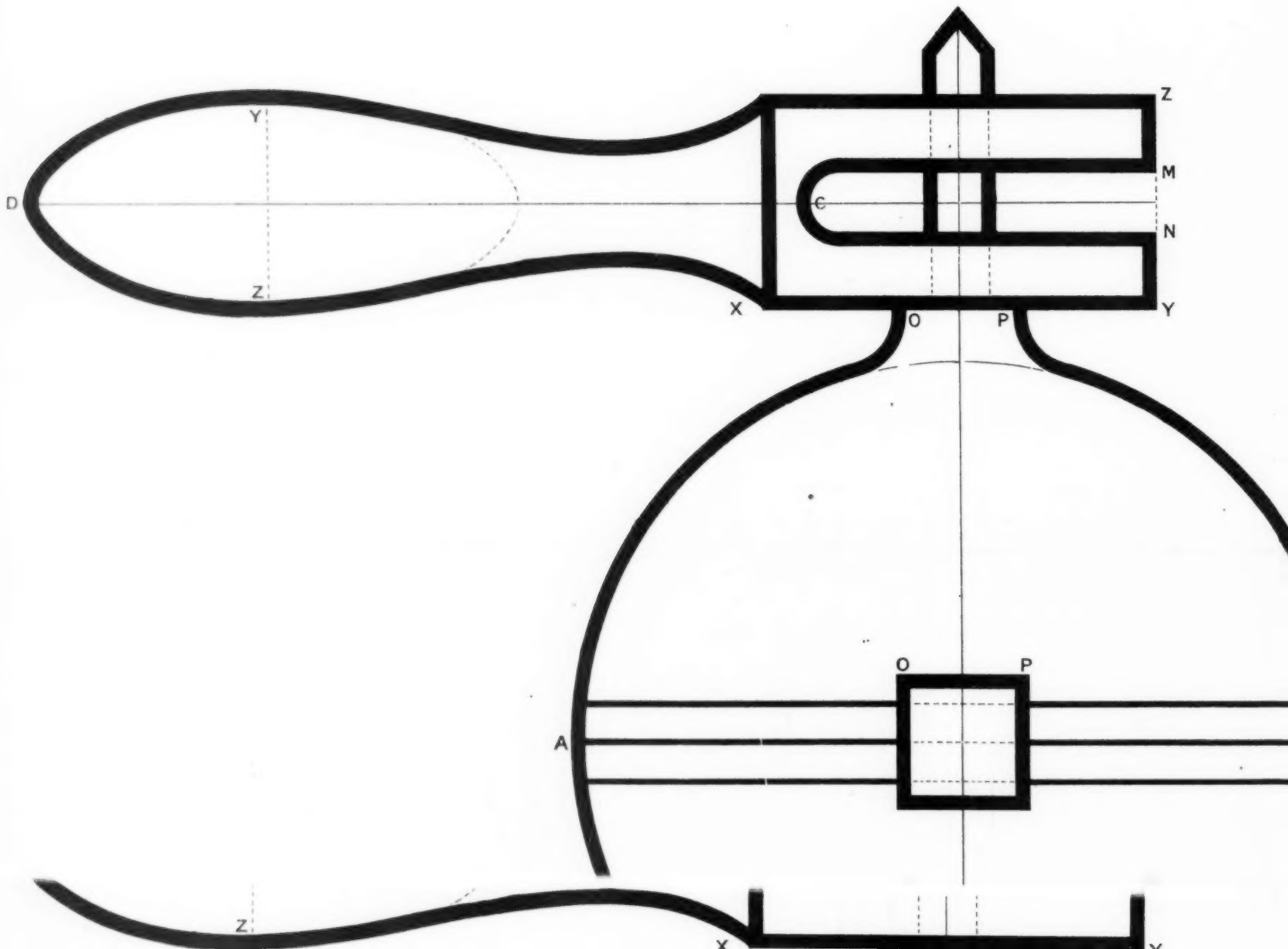

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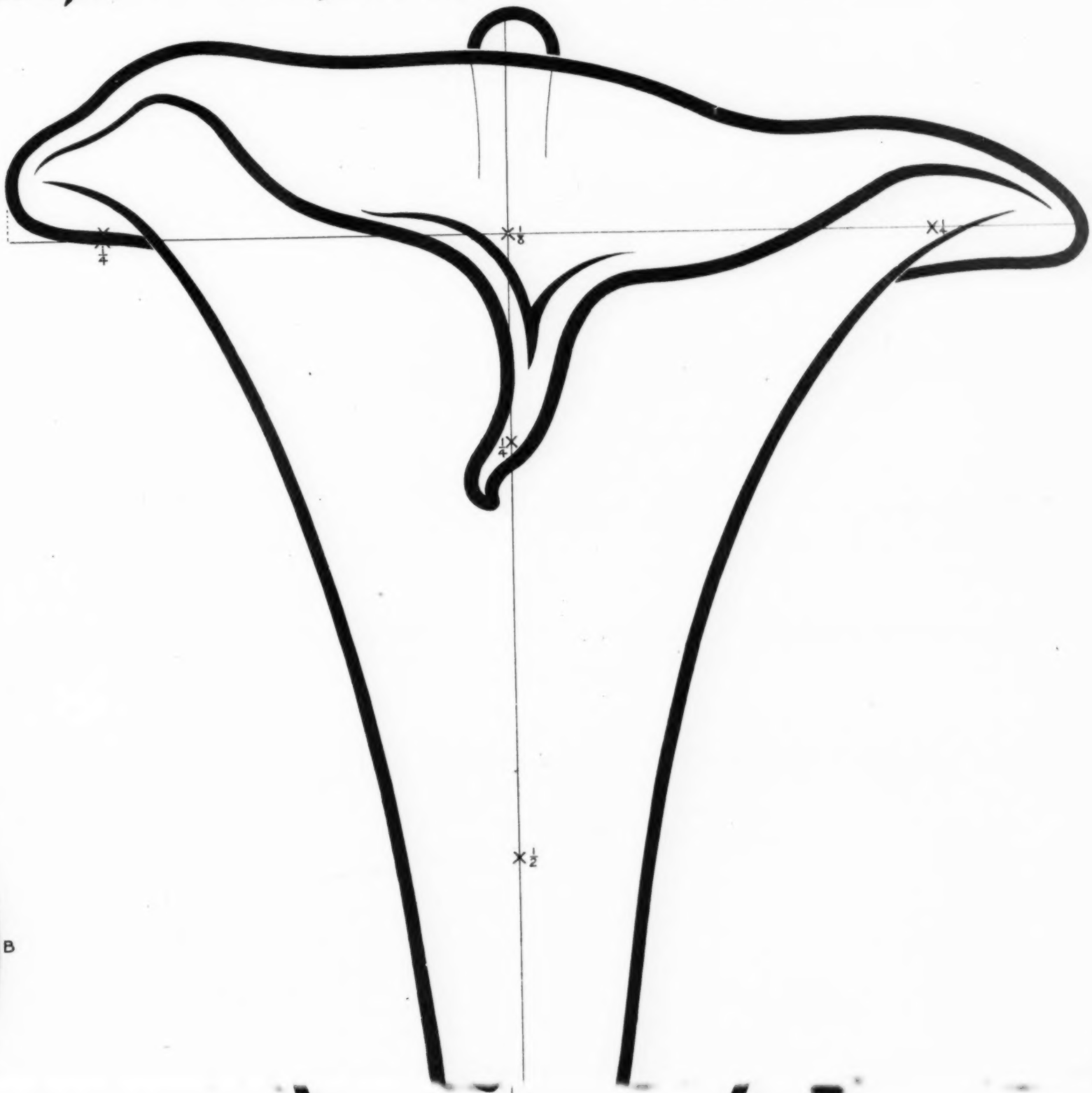

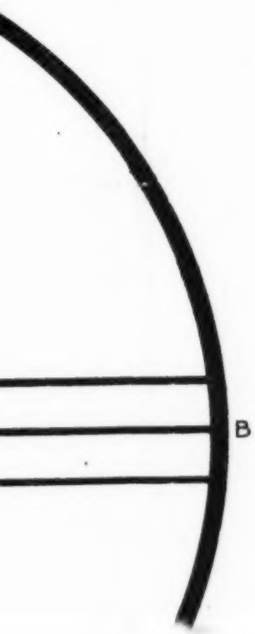

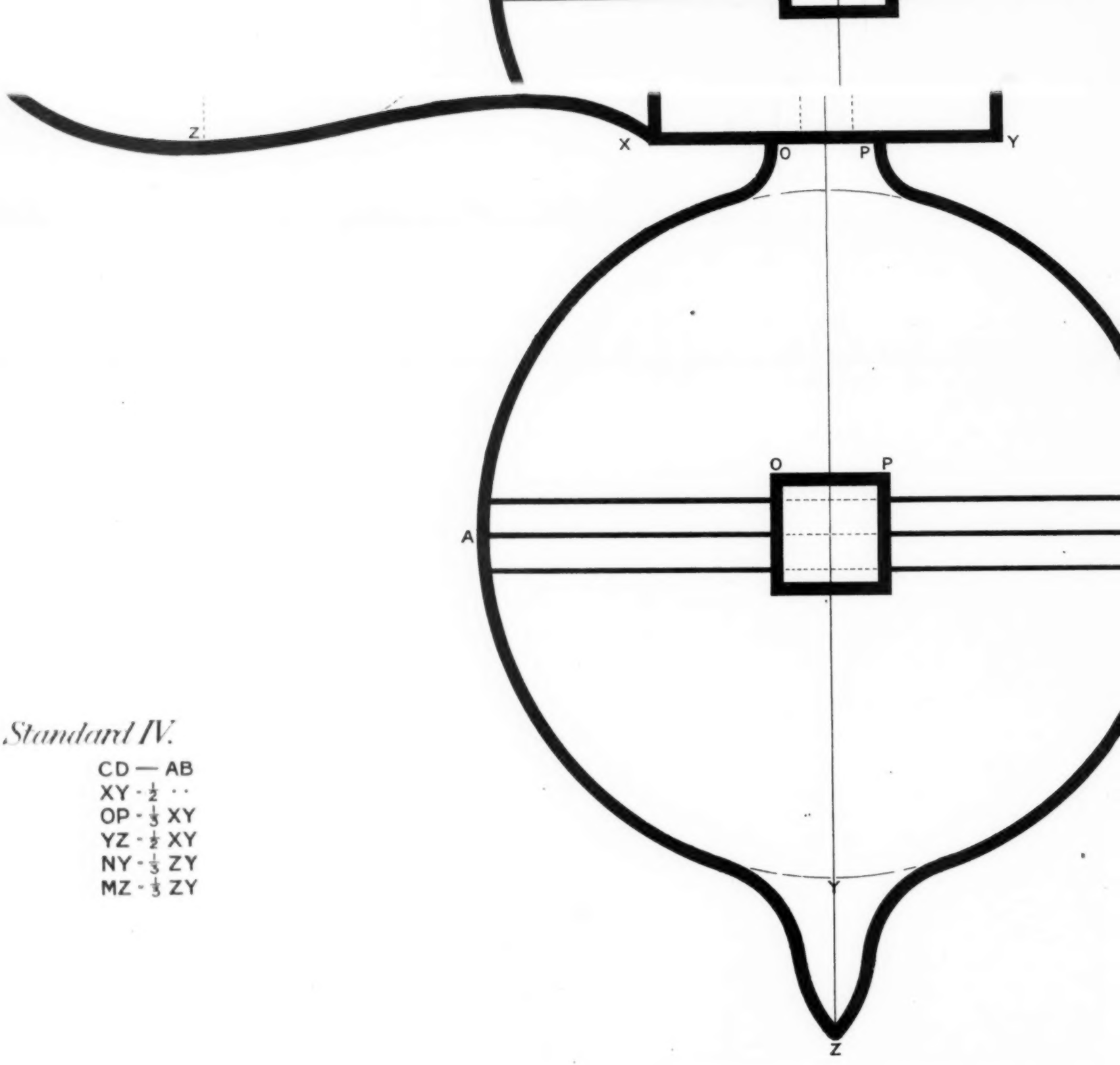

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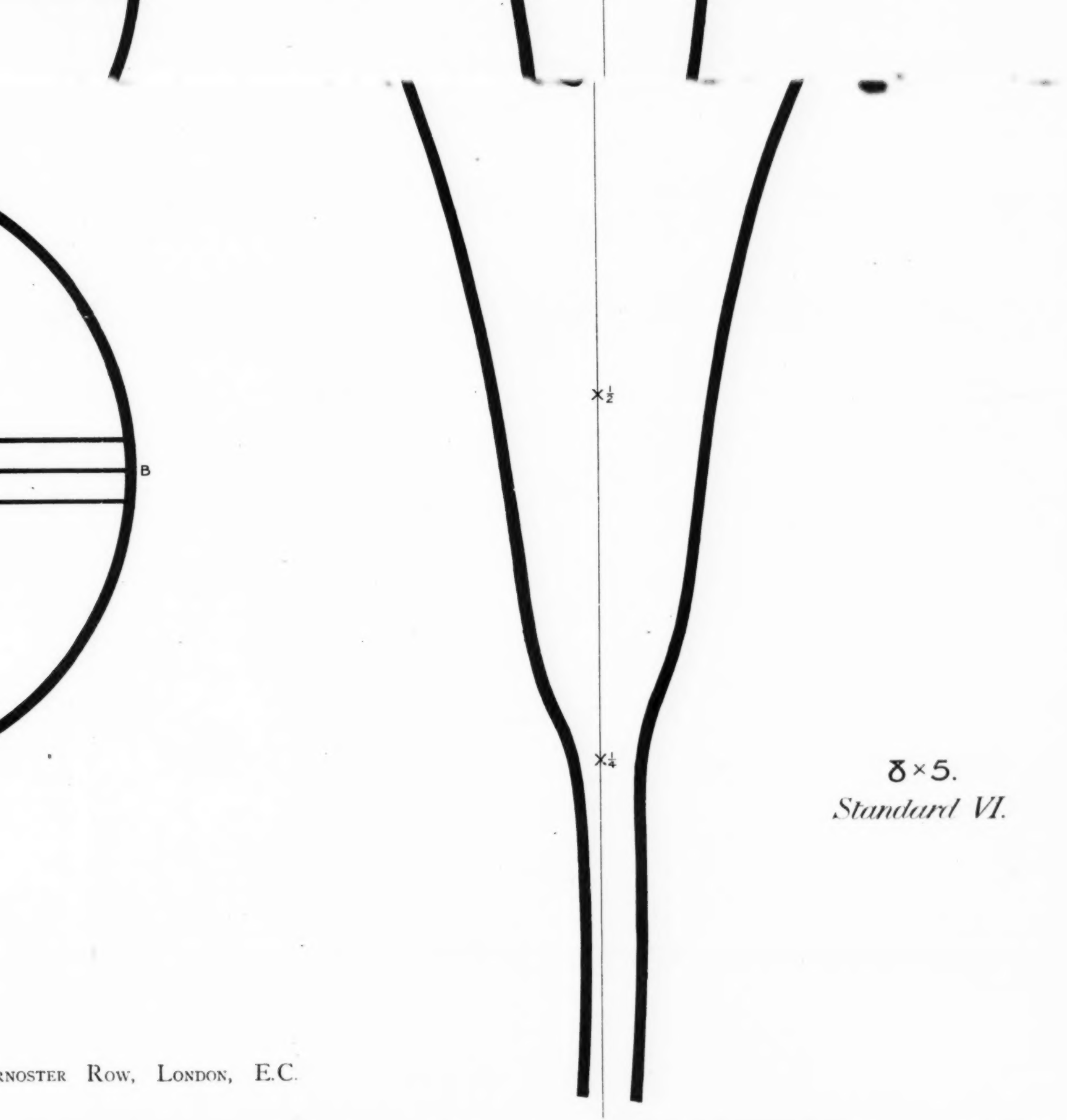

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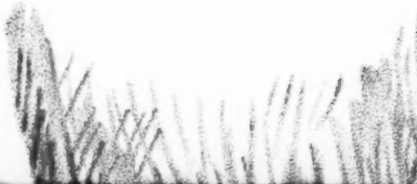

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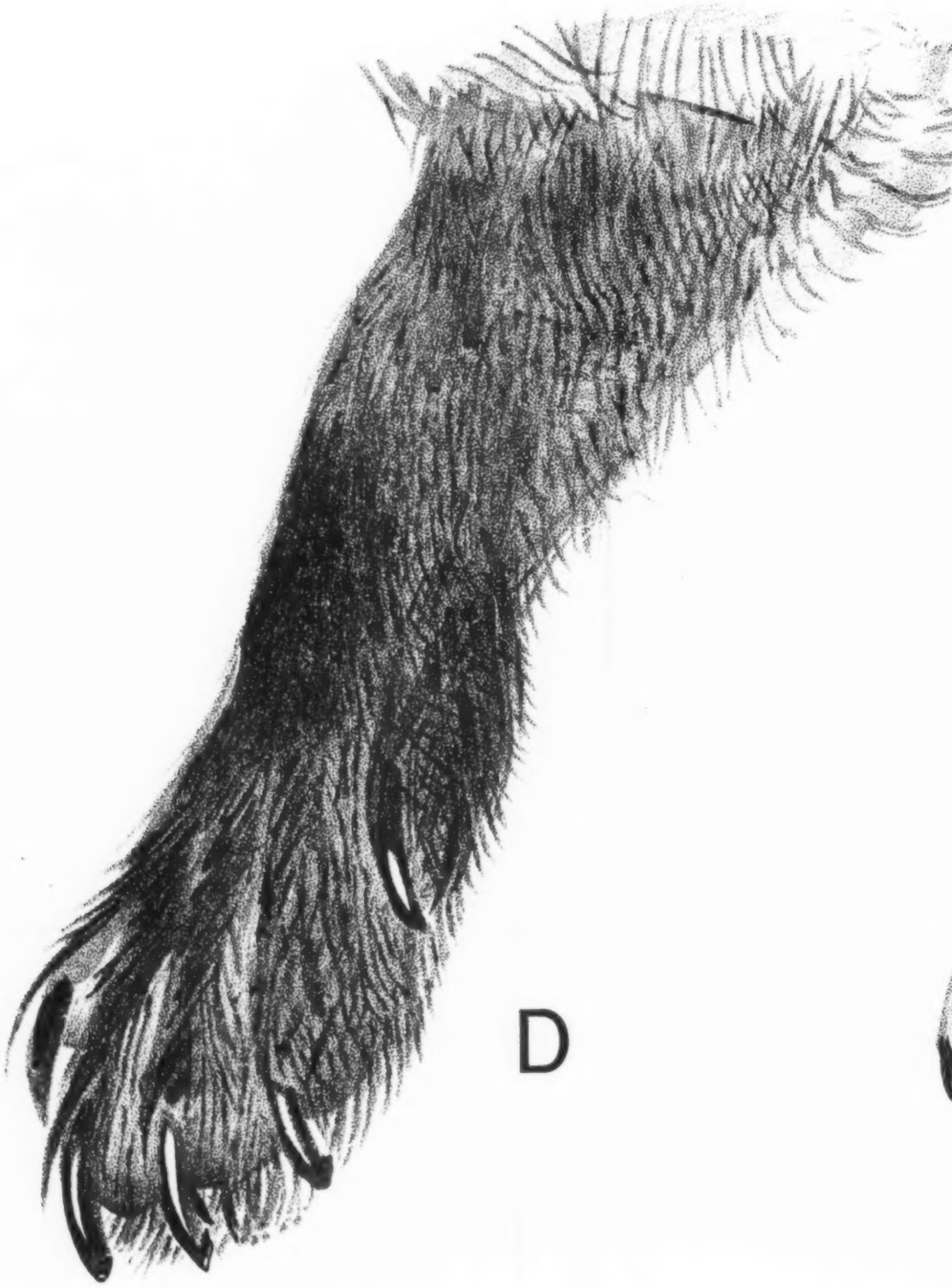

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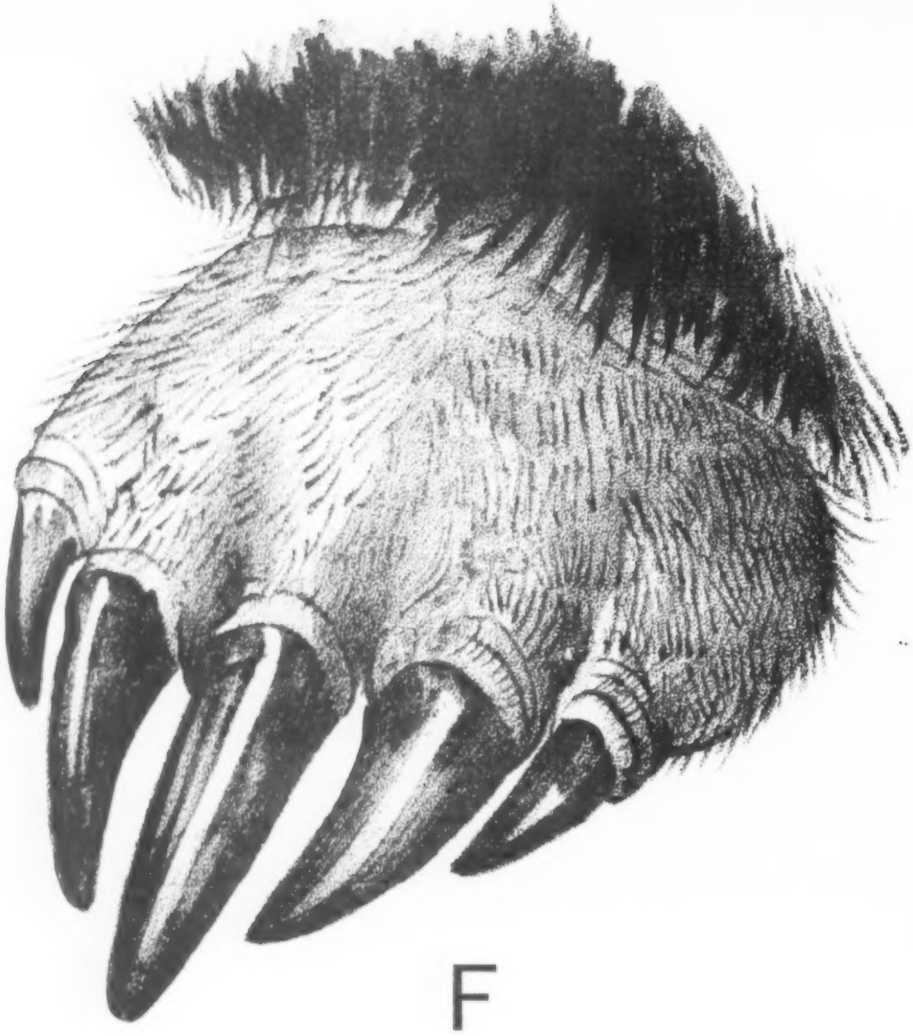

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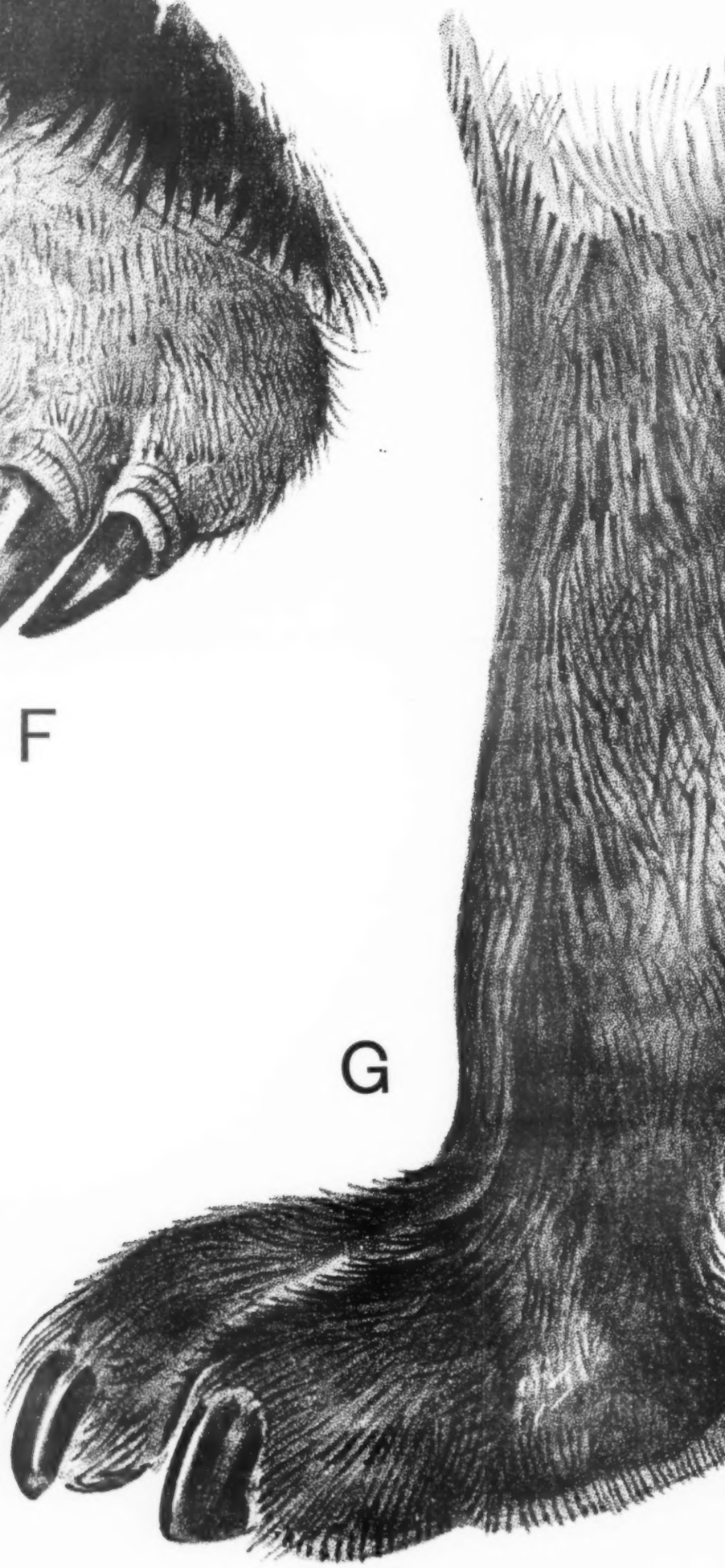

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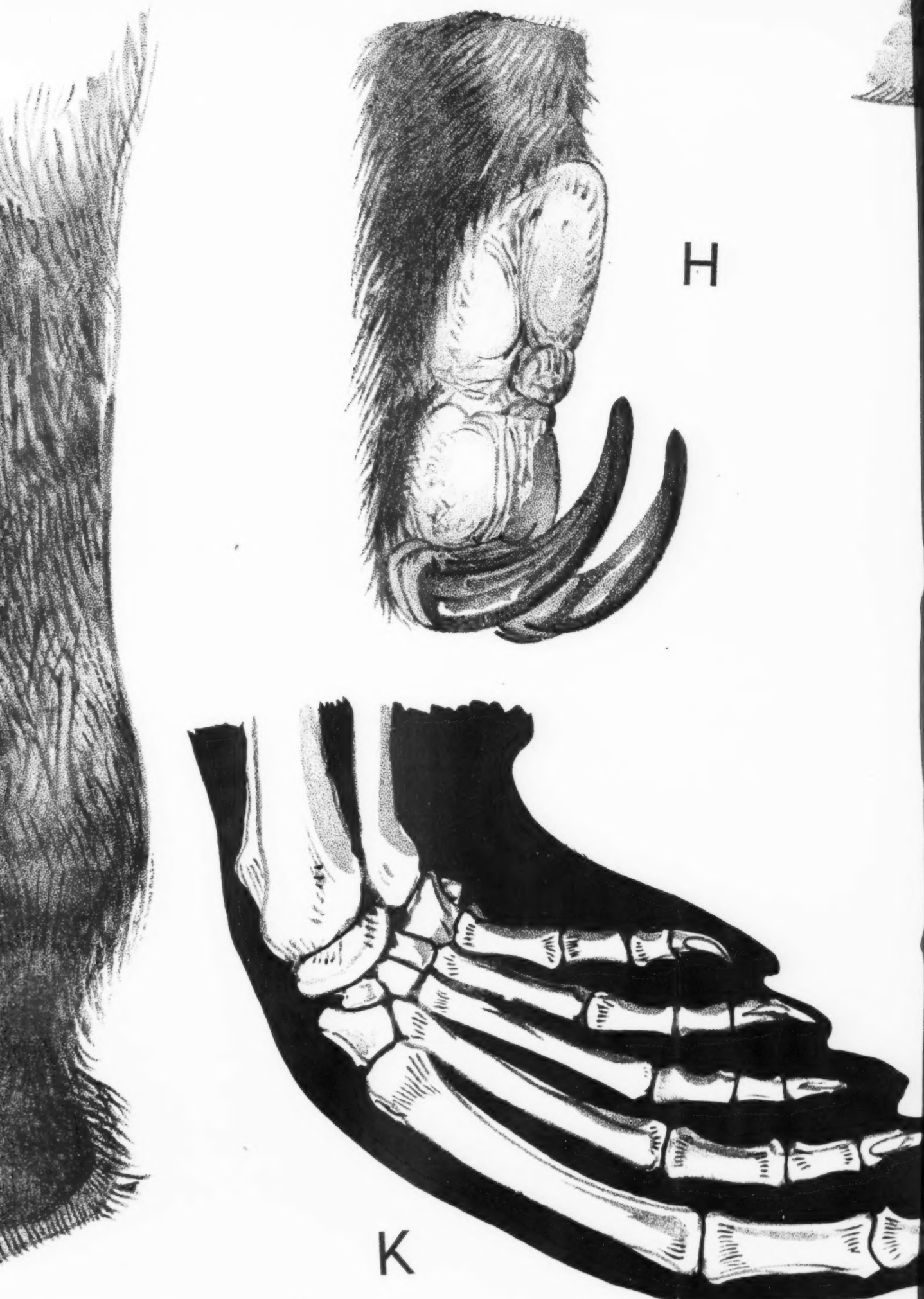
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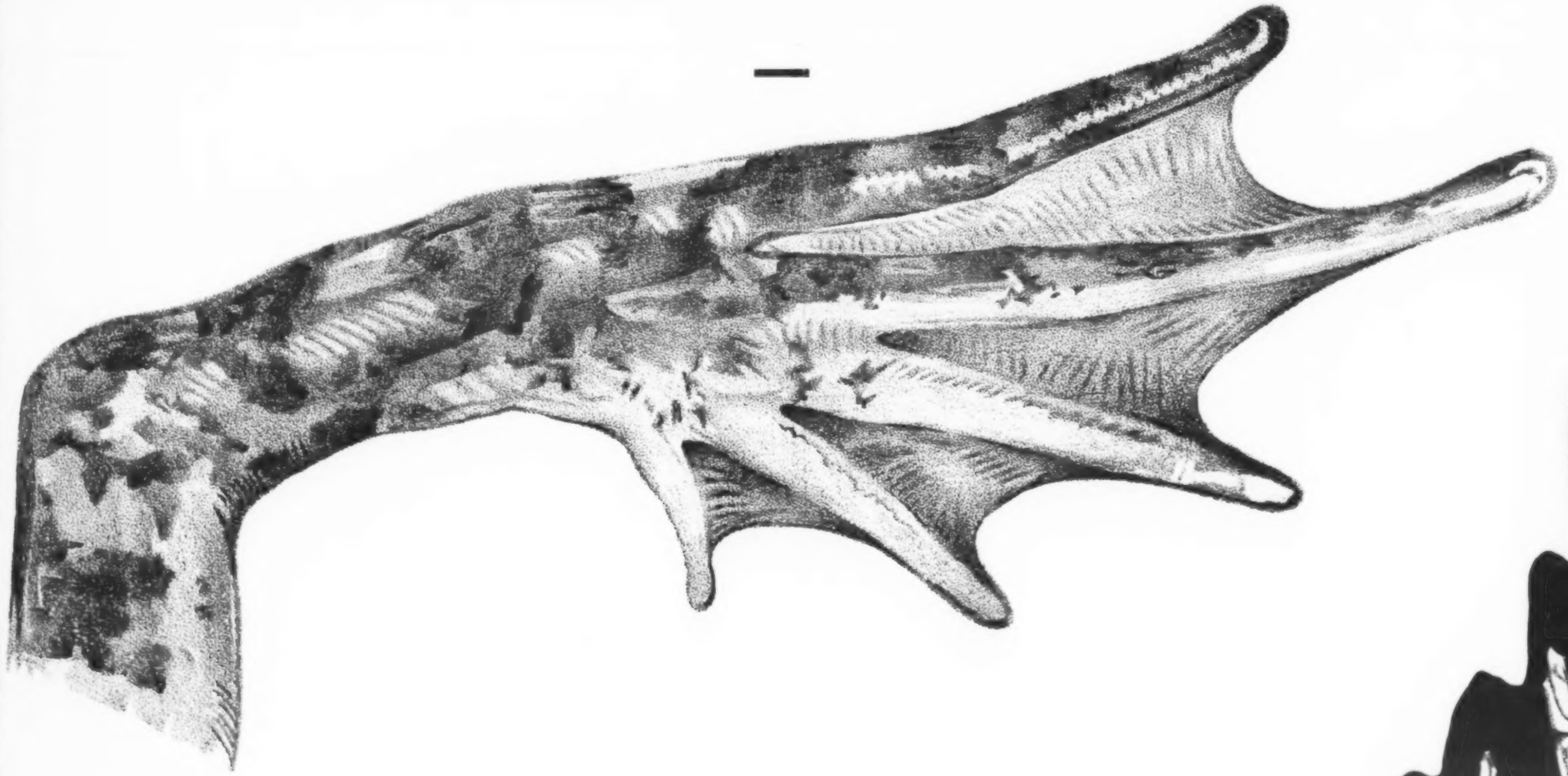

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THE feet of animals are specialized, modified, and adapted (as are all other portions of the body) according to their functions or uses. Thus there are feet for scraping, swimming, tearing, or climbing. No animal has more than five toes on each foot, but portions of both hand and foot may be suppressed or altered, or may even be absent, for specific purposes. The broad powerful foot of the Mole, used for burrowing and digging, is furnished with strong claws. The toes may be webbed, as in the Otter, the Beaver, the Frog, and the Seal, or they may be extremely narrow and pointed, as in the swift-footed Antelopes and Gazelles; the feet may be furnished with soft broad pads, as in the Camel and Dromedary; or the arm and extended fingers may be webbed for the purpose of flight, as in the Bats. The toes may be reduced to two, each having long curved nails for the purpose of tree climbing, as in the Sloth; and, finally, the foot may be reduced to a single toe, as in the Horse (see "Horse" Diagram in first series). The terminal portions of the toes may also be variously modified. They are narrow and long in most Monkeys; sharply pointed and retractile in the Cat family; excessively long and hooked in the Sloth; or entirely absent, as in the Frogs and Toads.

A.—Right hand (or fore-foot) of Monkey. It is very narrow; fingers well developed, with narrow nails; thumb or first finger very short, and not opposable.

B.—Right fore-foot of Cat. Sharp-pointed *retractile* claws; very short thumb; foot having soft pads under each toe.

C.—Right fore-foot of Dog. Foot much narrower than that of Cat; nails fixed or non-retractile; very short thumb.

D.—Right fore-foot of Rabbit. Nails long; foot entirely covered with hair on under surface; no pads.

E.—Right fore-foot of Mouse. Nails well developed; thumb very rudimentary; bare on the under surface.

F.—Right fore-foot of Mole. Very broad, powerful, and muscular; stout, strong nails; bare on the under surface; slightly covered with hair on upper surface.

G.—Right fore-foot of Camel. Only two toes, with short hoof-like nails; very broad pads.

H.—Right fore-foot of Sloth. Only two toes, strong and well curved; foot bare.

I.—Left hind-foot of Frog. Almost fully webbed; there are no nails. (The fore-foot is not webbed.)

K.—Left fore-foot or flipper of Fur Seal. The toes are not separate, but are bound up or united in the form of a paddle to aid in progression through the water. The nails are extremely small, and are often absent.

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